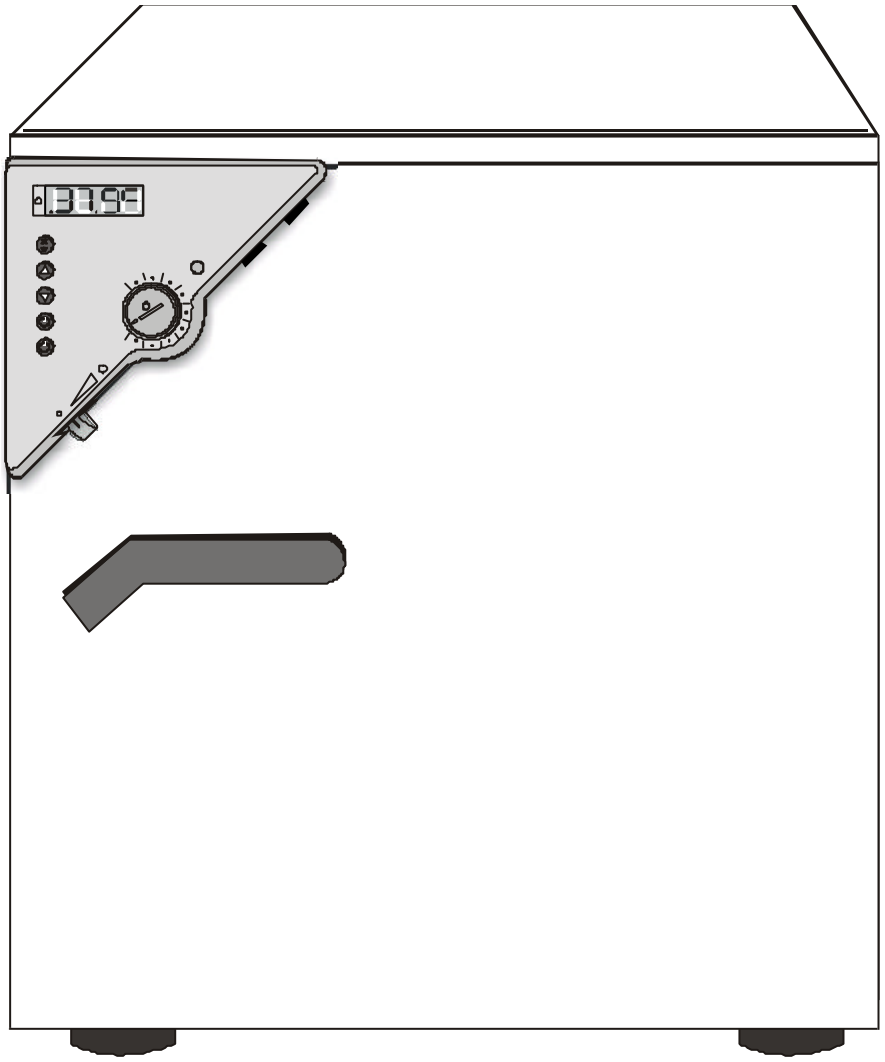
BD/ED/FD (E2) Service Manual



Version of chamber described in this service manual:

Standard equipped BD, ED, FD
with
R3 Controller

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1 Chamber Description

1.1 BD (E2)

The BD (E2) chamber was developed for microbiology. The chamber is equipped with a R3 controller and as an Option available with a RS422 Interface. The highest achievable temperature is 100°C.

The BD (E2) Chamber is available in the sizes 53, 115, 240, 400 and 720.

1.2 ED (E2)

The ED (E2) chamber was developed for drying and hot air sterilizing with natural convection. The chamber is equipped with a R3 controller and as an Option available with RS422 Interface. The highest achievable temperature is 300°C.

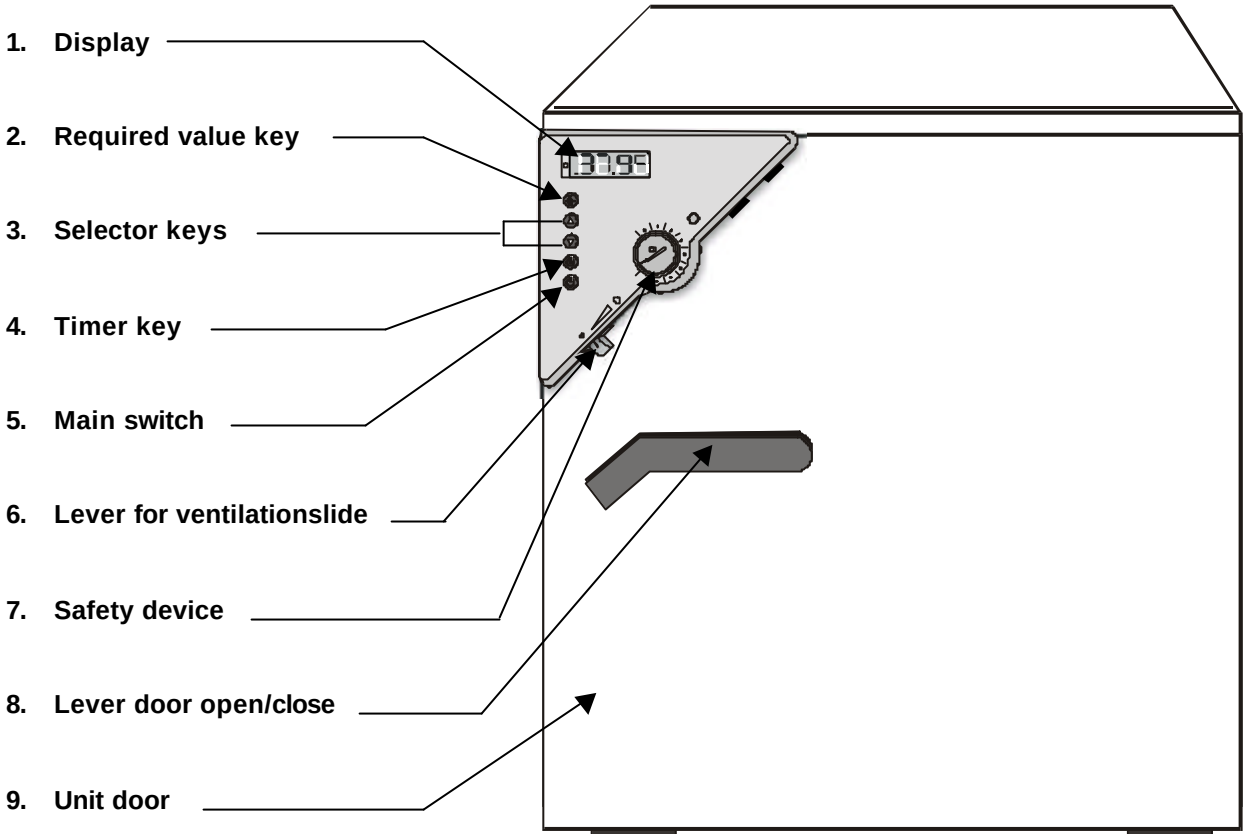
The ED (E2) Chamber is available in the sizes 53, 115, 240, 400 and 720.

1.3 FD (E2)

The FD (E2) chambers was developed for drying and hot air sterilizing with forced convection. The chamber is equipped with a R3 controller and as an Option available with RS422 Interface. The highest achievable temperature is 300°C.

The FD (E2) Chamber is available in the sizes 53, 115, 240, 400 and 720.

1.4 Description of the Chamber BD, ED and FD



Picture 1: Heating Oven with R3-Controller

2 Function

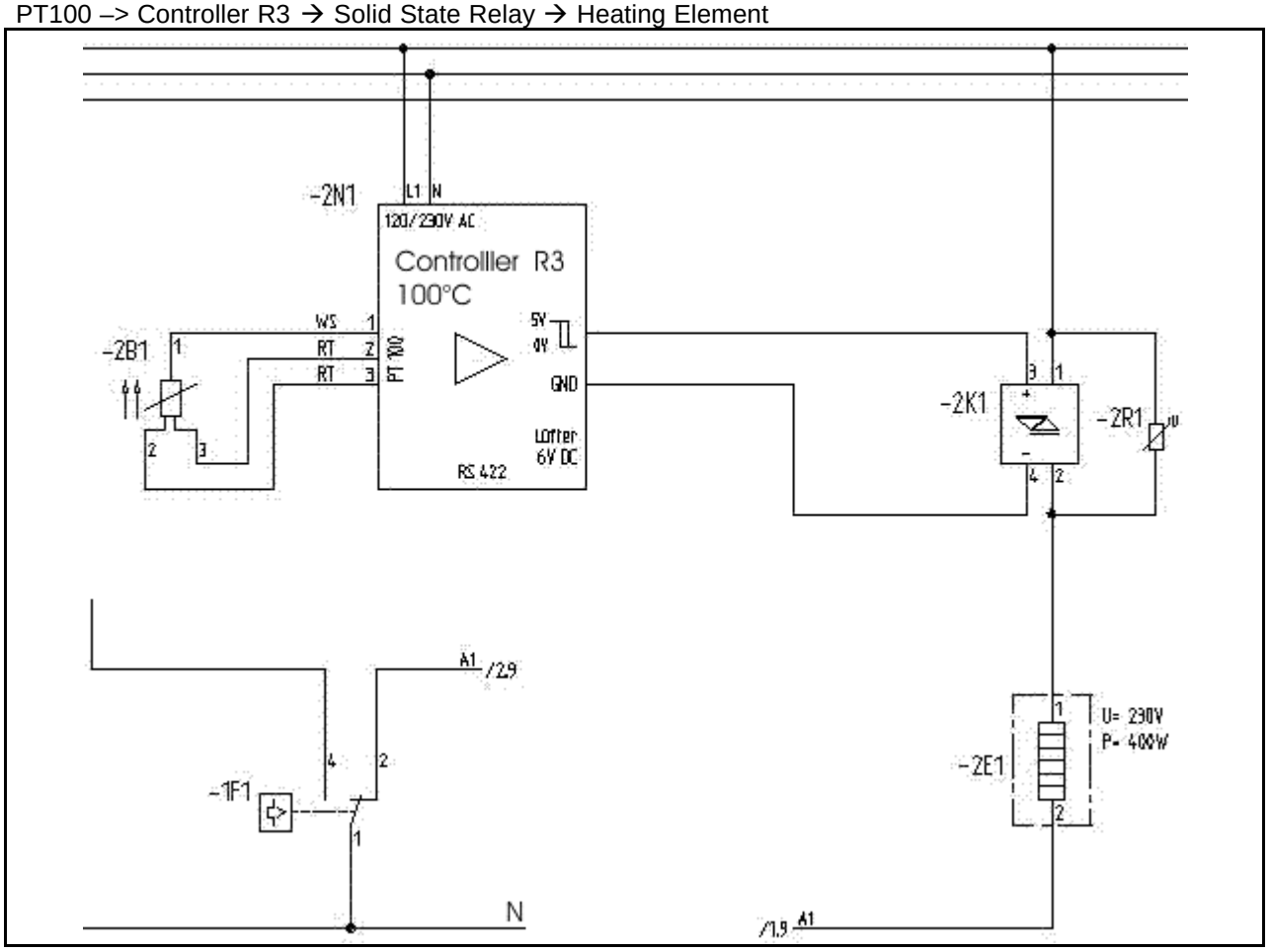
2.1 BD (E2)

The BD (E2) chamber gives the possibility to heat up the chamber to a maximum temperature of 100°C. The measuring of the temperature will be realized by a PT100 temperature probe which is placed directly in the inner of the chamber .

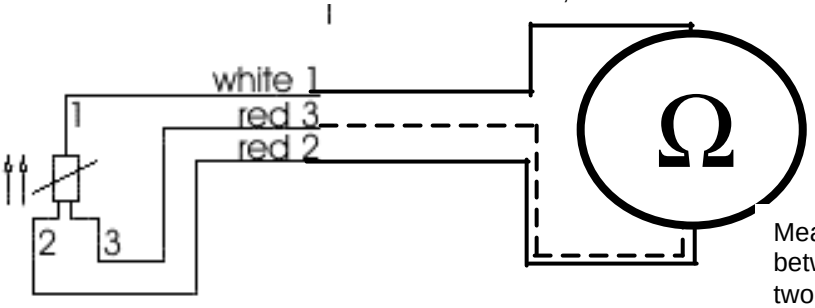
The controller R3 measures the resistance of the PT100 temperature probe and compares the incoming signal with the actual engaged value and decides to give a Signal to activate the heating elements or not.

2.2 Flow Chart of the Heating System of a BD (E2) (Standard BD 115 (E2))

PT100 –> Controller R3 → Solid State Relay → Heating Element



The PT100 temperature probe is a resistance-measurement system. This means that the PT100 changes his resistance at different temperatures. For example: at 37°C, the resistance of the PT100 have to be 114,380 Ω. To measure the resistance, disconnect all three cables from the controller and measure between the white cable and one of the red cables, don't measure between both red cables.



Measuring of the PT100 resistance between the white cable 1 and one of the two red cables 2 or 3

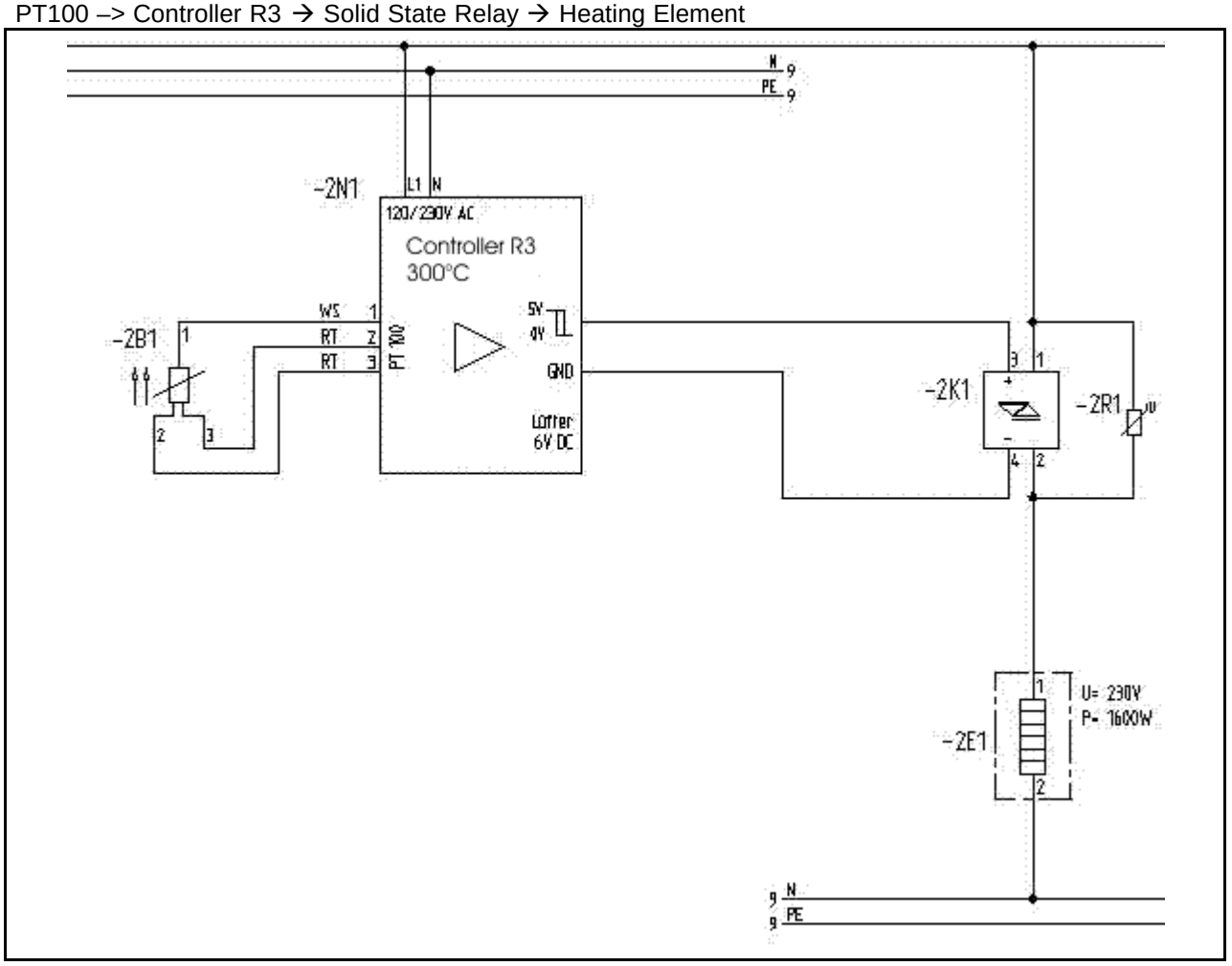
2.3 ED (E2)

The ED (E2) chamber gives the possibility to heat up the chamber to a maximum temperature of 300°C. The measuring of the temperature will be realized by a PT100 temperature probe which is placed directly in the inner of the chamber .

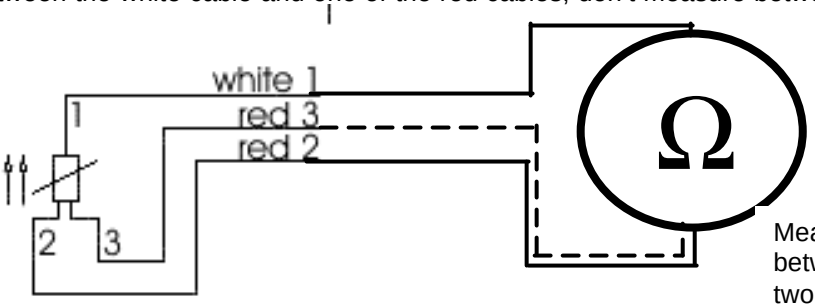
The controller R3 measures the resistance of the PT100 temperature probe and compares the incoming signal with the actual engaged value and decides to give a Signal to activate the heating elements or not.

2.4 Flow Chart of the Heating System of a ED (E2) (Standard ED 115 (E2))

PT100 –> Controller R3 → Solid State Relay → Heating Element



The PT100 temperature probe is a resistance-measurement system. This means that the PT100 changes his resistance at different temperatures. For example: at 37°C, the resistance of the PT100 have to be 114,380 Ω. To measure the resistance, disconnect all three cables from the controller and measure between the white cable and one of the red cables, don't measure between both red cables.



Measuring of the PT100 resistance between the white cable 1 and one of the two red cables 2 or 3

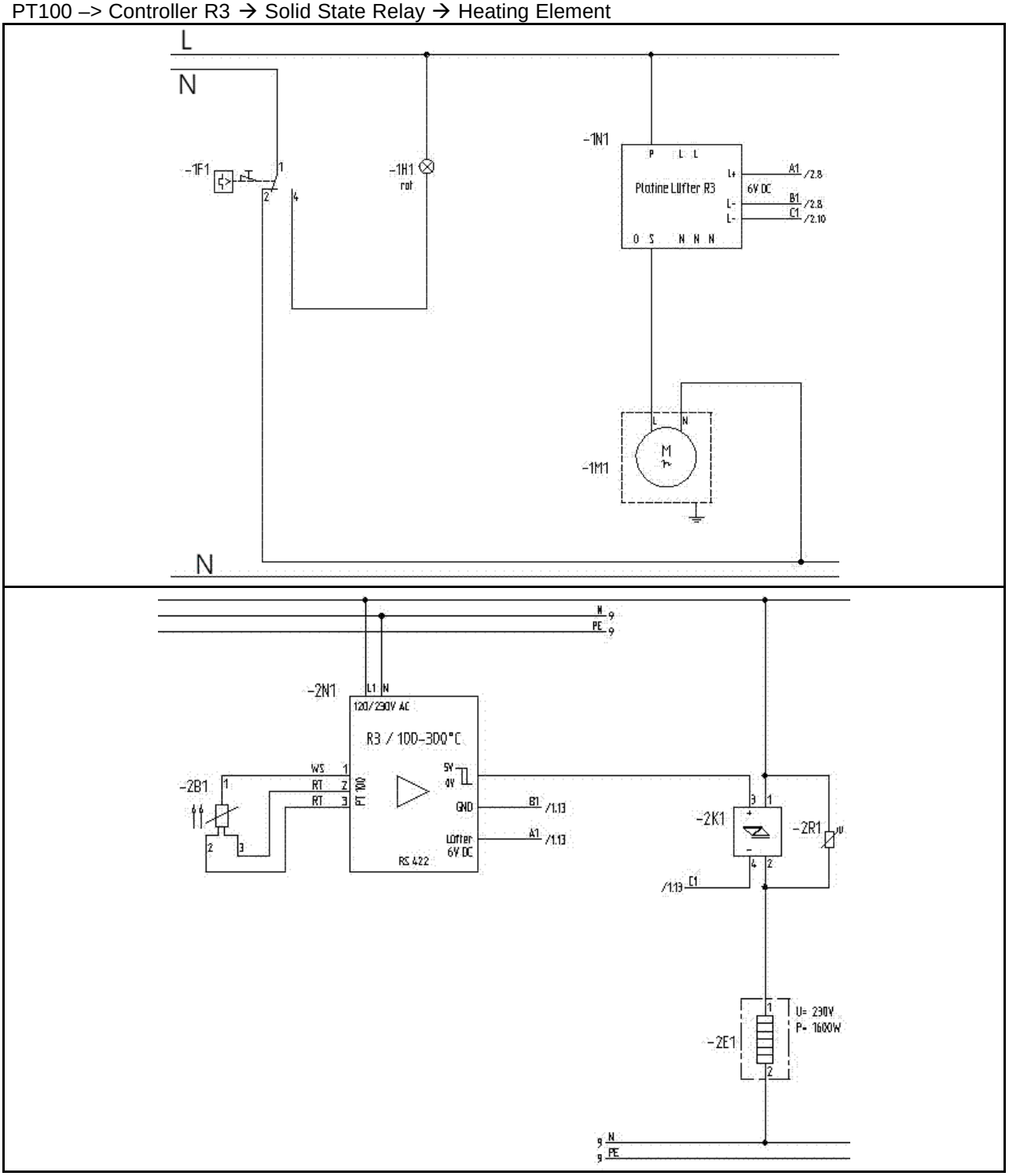
2.5 FD (E2)

The FD (E2) chamber gives the possibility to heat up the chamber to a maximum temperature of 300°C. The measuring of the temperature will be realized by a PT100 temperature probe which is placed directly in the inner of the chamber .

The controller R3 measures the resistance of the PT100 temperature probe and compares the incoming signal with the actual engaged value and decides to give a Signal to activate the heating elements or not.

2.6 Flow Chart of the Heating System of a FD (E2) (Standard FD 115 (E2))

PT100 –> Controller R3 → Solid State Relay → Heating Element

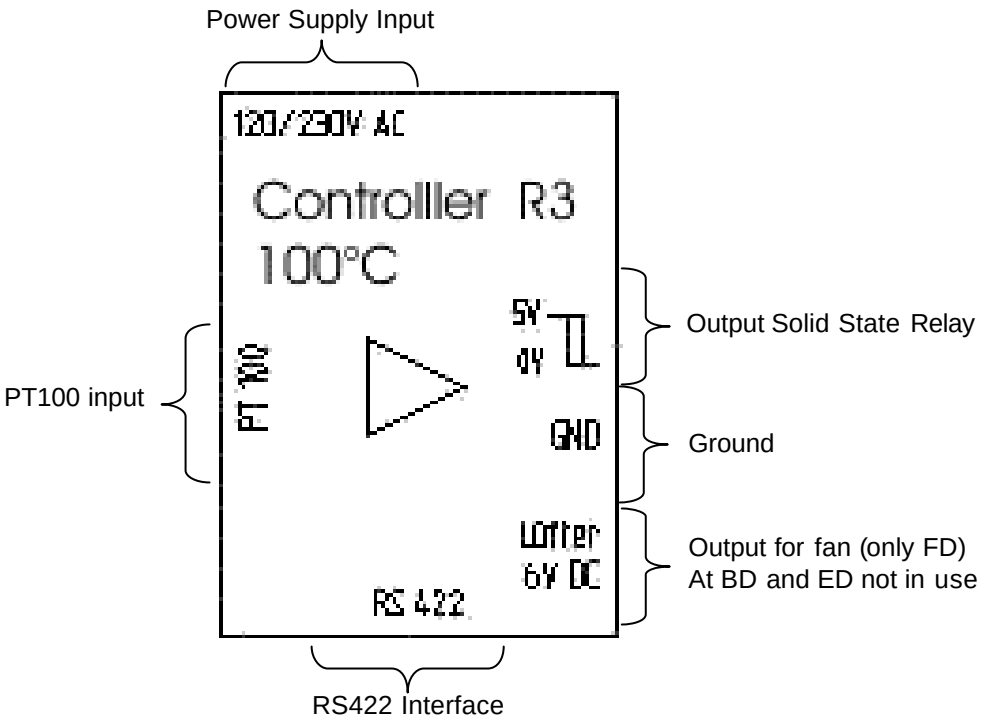


2.7 PT100 Temperature Probe Resistance/Temperature Table

T (°C)	0	1	2	3	4	5	6	7	8	9	10
-10	96,086	96,478	96,870	97,262	97,653	98,045	98,436	98,827	99,218	99,609	100,000
0	100,000	100,391	100,781	101,172	101,562	101,953	102,343	102,733	103,123	103,513	103,902
10	103,902	104,292	104,681	105,071	105,460	105,849	106,238	106,627	107,016	107,404	107,793
20	107,793	108,181	108,570	108,958	109,346	109,734	110,122	110,509	110,897	111,284	111,672
30	111,672	112,059	112,446	112,833	113,220	113,607	113,994	114,380	114,767	115,153	115,539
40	115,539	115,925	116,311	116,697	117,083	117,469	117,854	118,240	118,625	119,010	119,395
50	119,395	119,780	120,165	120,550	120,934	121,319	121,703	122,087	122,471	122,855	123,239
60	123,239	123,623	124,007	124,390	124,774	125,157	125,540	125,923	126,306	126,689	127,072
70	127,072	127,454	127,837	128,219	128,602	128,984	129,366	129,748	130,130	130,511	130,893
80	130,893	131,274	131,656	132,037	132,418	132,799	133,180	133,561	133,941	134,322	134,702
90	134,702	135,083	135,463	135,843	136,223	136,603	136,982	137,362	137,741	138,121	138,500
100	138,500	138,879	139,258	139,637	140,016	140,395	140,773	141,152	141,530	141,908	142,286

For Example: Your resistance measurement system shows you 114,380 Ω this corresponds to 37°C.

2.8 Description of the R3 controller Inputs and Outputs



3 Trouble Shooting

3.1 BD Chamber

Fault Description	Fault Cause
Not possible to reach the temperature within the specification time	• The door doesn't close completely. • The door sealing is broken or damaged • The controller need a calibration
The chamber heats over the temperature setting	• The solid state relay could be defect • The controller could be defect • The PT100 could be defect • The controller need a calibration
The chamber doesn't heat any time, the indicator light doesn't lights up	• The safety device has switched off the chamber • Timer off • The controller is defect
The chamber doesn't heat any time, the indicator light lights up	• The solid state relay is defect • The Heating element(s) is/are defect
The glass door of the chamber doesn't close.	• The plastic catcher is defect
The chamber doesn't do anything	• Check if the power supply cable is connected to the mains • Check if the mains has 115V or 230V voltage
The chamber doesn't do anything, only the green LED lights	• The chamber is in Stand-by mode
No data transfer to and from the APT-Com possible. The installation is correctly. (At BD with Interface)	• Wrong chamber address is set at the controller

3.2 ED Chamber

Fault Description	Fault Cause
Not possible to reach the temperature within the specification time	• The door doesn't close completely. • The door sealing is broken or damaged • The controller need a calibration
The chamber heats over the temperature setting	• The solid state relay could be defect • The controller could be defect • The PT100 could be defect • The controller need a calibration
The chamber doesn't heat any time, the indicator light doesn't lights up	• The safety device has switched off the chamber • Timer off • The controller is defect
The chamber doesn't heat any time, the indicator light lights up	• The solid state relay is defect • The Heating element(s) is/are defect
The glass door of the chamber doesn't close.	• The plastic catcher is defect
The chamber doesn't do anything	• Check if the power supply cable is connected to the mains • Check if the mains has 115V or 230V voltage
The chamber doesn't do anything, only the green LED lights	• The chamber is in Stand-by mode
No data transfer to and from the APT-Com possible. The installation is correctly. (At ED with Interface)	• Wrong chamber address is set at the controller

3.3 FD Chamber

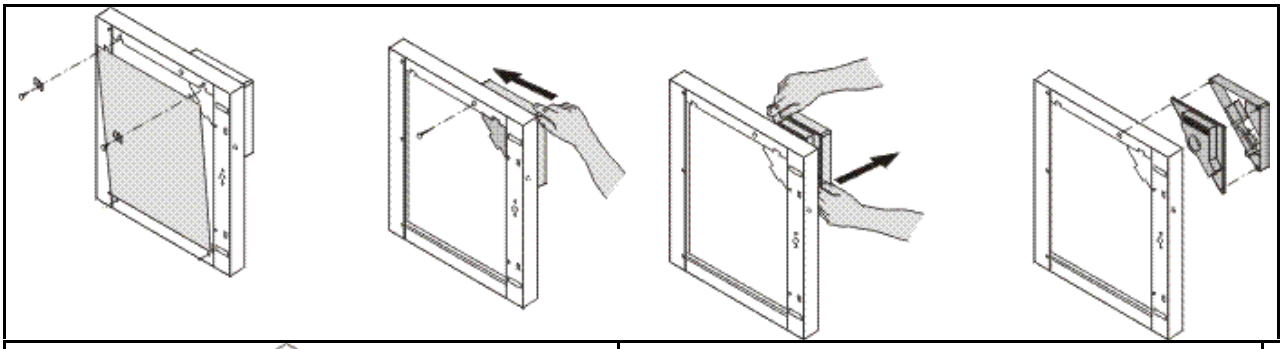
Fault Description	Fault Cause
Not possible to reach the temperature within the specification time	• The door doesn't close completely. • The fan doesn't work • The door sealing is broken or damaged • The controller need a calibration
The chamber heats over the temperature setting	• The solid state relay could be defect • The controller could be defect • The PT100 could be defect • The controller need a calibration
The chamber doesn't heat any time, the indicator light doesn't lights up	• The safety device has switched off the chamber • Timer off • The controller is defect
The chamber doesn't heat any time, the indicator light lights up	• The solid state relay is defect • The Heating element(s) is/are defect
The glass door of the chamber doesn't close.	• The plastic catcher is defect
The chamber doesn't do anything	• Check if the power supply cable is connected to the mains • Check if the mains has 115V or 230V voltage
The chamber doesn't do anything, only the green LED lights	• The chamber is in Stand-by mode
No data transfer to and from the APT-Com possible. The installation is correctly. (At FD with Interface)	• Wrong chamber address is set at the controller

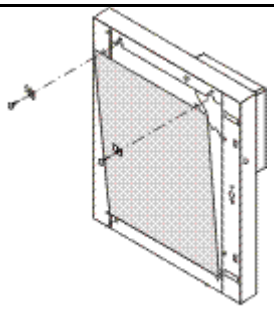
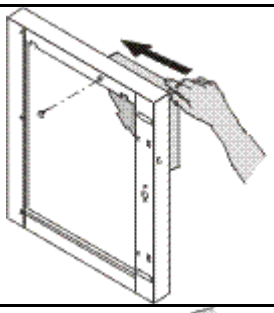
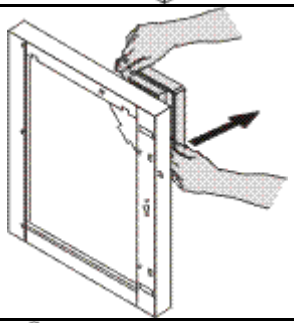
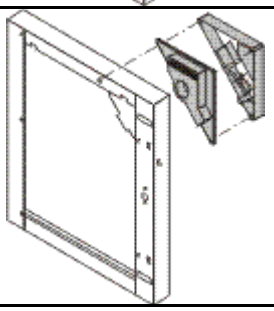
3.4 APT-COM at BD, ED and FD

Fault Description	Fault Cause
No Function	• Connection is wrong, check the connection like described in Chapter **5 APT-COM Connection** • Address in the controller is wrong • Controller is in Stand-By mode
No data transfer to and from the APT-Com possible. The installation is correctly.	• Wrong chamber address is set at the controller • The connection cable is broken/defect • The Switch at the converter is set to DCE (correct = DTE) • The converter doesn't get the needed current

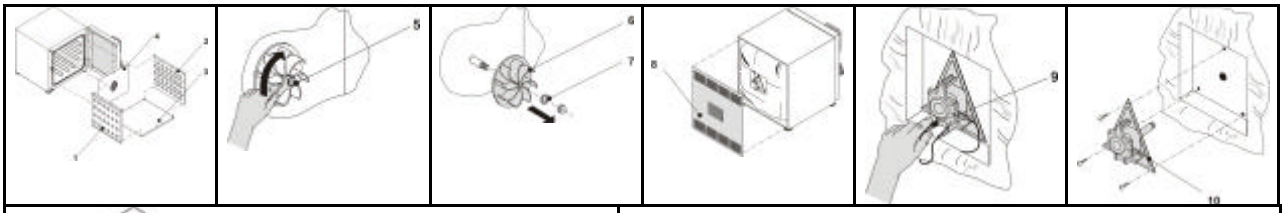
4 Most common service works

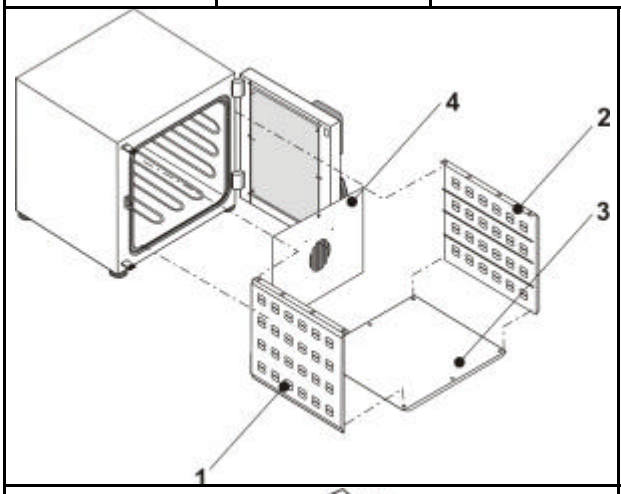
4.1 Changing of the controller R3



	You have to open the two screws at the top of the inner door. After that you can lift out the inner door, but be careful the temperature safety device is inside the door.
	Now open the screw behind the white plastic cover. The plastic cover could be broken after that. Now you have to press like shown picture at the perpendiculars side to bring out the controller housing. Please press only in arrow direction.
	Now you can take off the complete housing, be careful, the temperature safety device is connected.
	At the rear side of the housing you'll find two screws, you have to open them to work on the controller. To bring back the controller in starting situation, please fit it together in opposite direction.

4.2 Changing of the fan at FD (E2) chamber

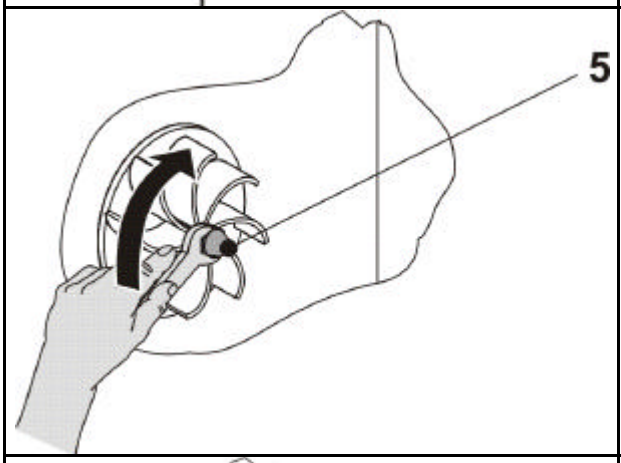




You have to unscrew the two side-walls (1 + 2), the bottom (3) and the rear-wall (4) to reach the fan-wheel.

The side-walls are screwed at the topside.
Before you could bring out the rear-wall, you have to remove the PT-100 holder.

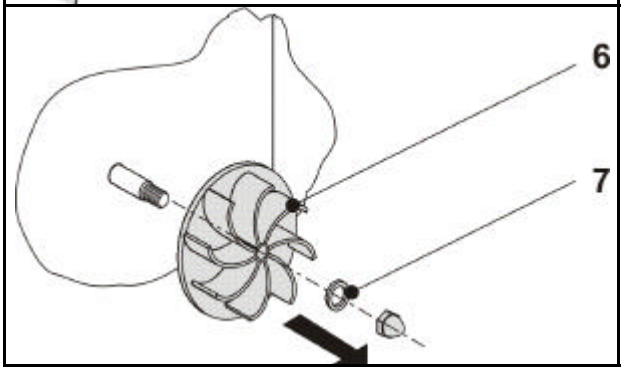
After this you can see the heating elements and also the fan-wheel



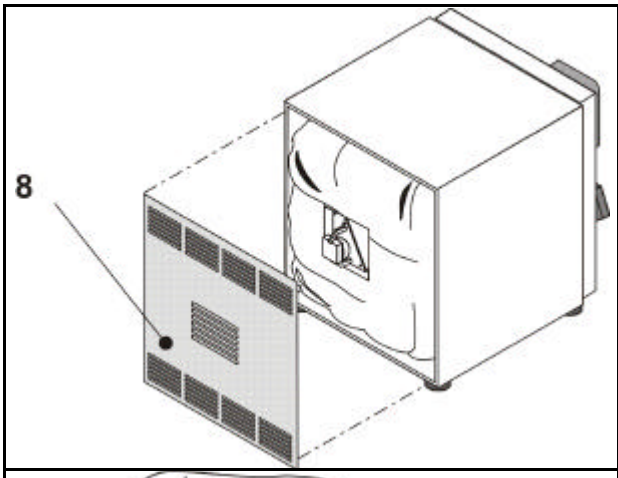
Now you have to open the nut at the front of the fan-wheel.

Notice: It is a left-thread.

Tool: box wrench size 13

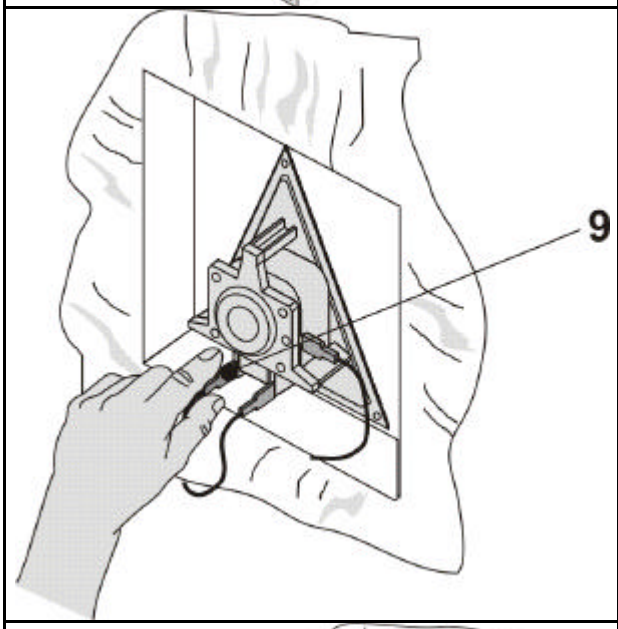


Now it is possible to remove the washer and also the fan-wheel.

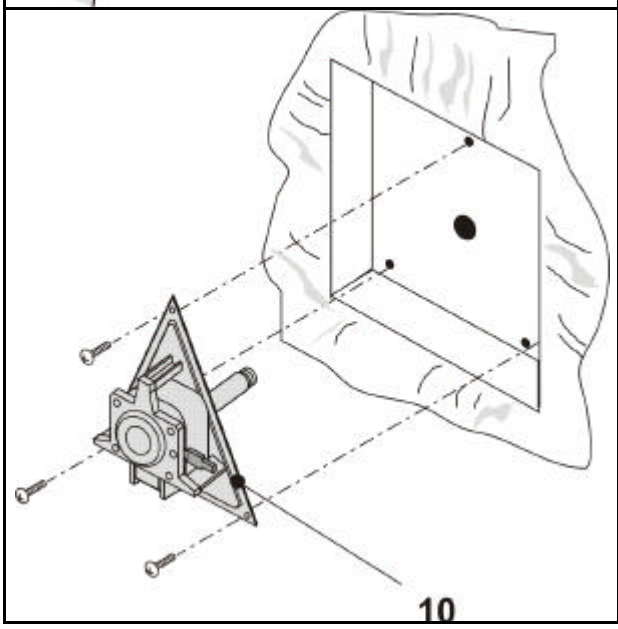


To take out the fan-motor with axis, you have to remove the rear-wall of the chamber.

Tool: Screwdriver (Phillips-Screw)



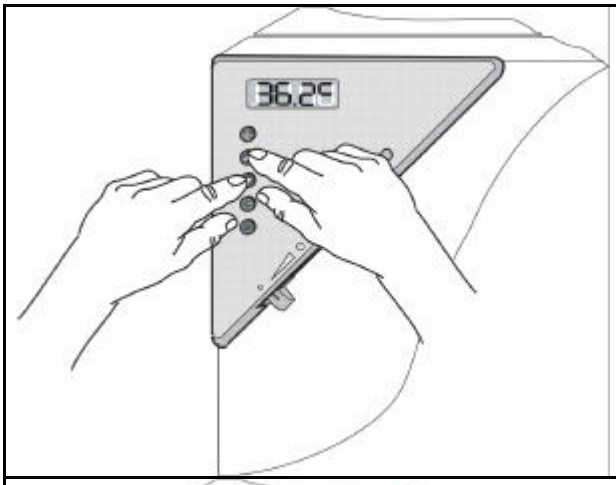
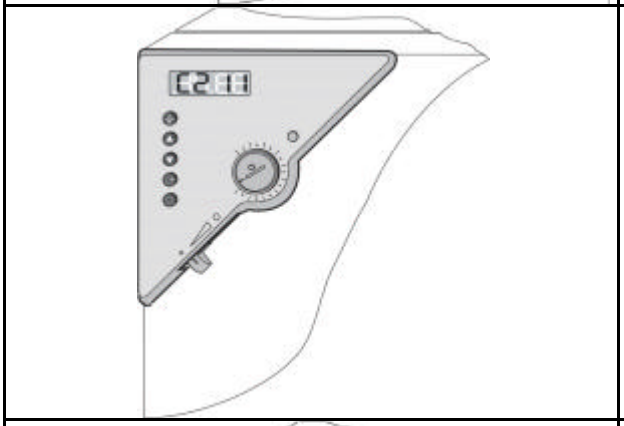
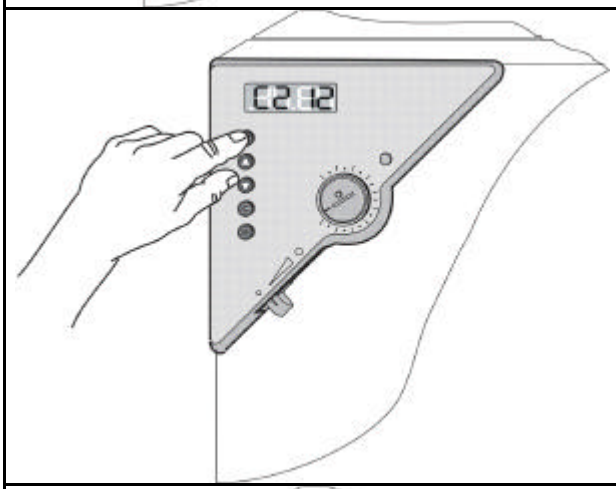
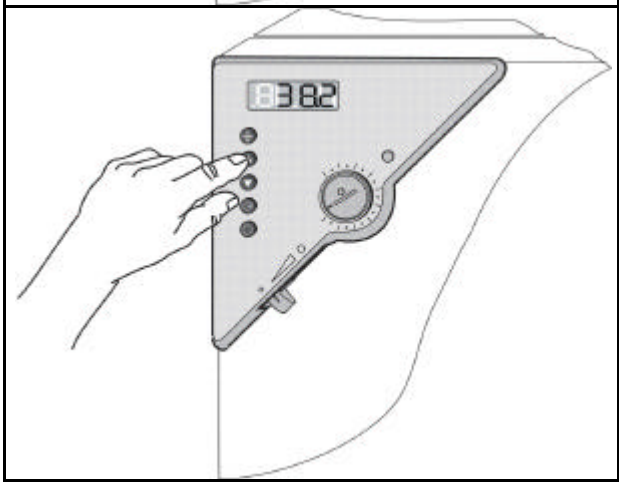
Now disconnect the connection-wires at the fan,
if possible mark them for right connection when you put in the new fan.

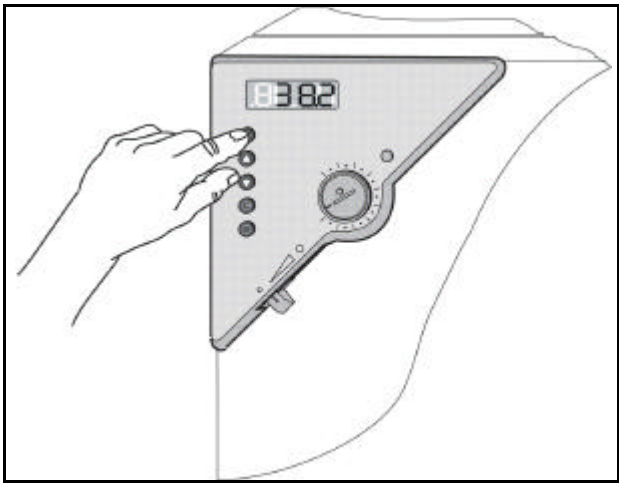


To take out the fan-motor with axis, you have to remove the three Phillips-screw at the triangle.

Now it is possible to take out the complete part.

4.3 Calibration Procedure “One Point Calibration”

	Press the Buttons and for 5 sec. simultaneously.
	After the 5 sec. you’ll see C211 in the display. **Don’t use this configuration for the One Point Calibration. You have to use the configuration C212**.
	Press the Button to go to configuration C212.
	Set the measured value with the Buttons and like displayed on your reference measurement system.



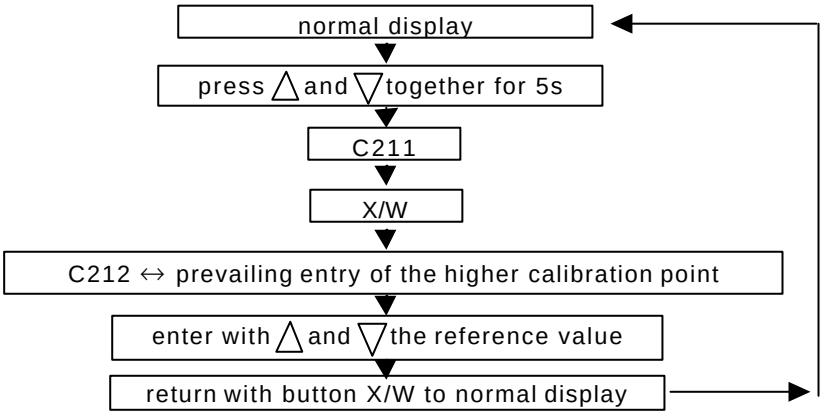
If you've done your settings press the X/W Button to come back to the Standard Display with the actual Temperature.

A electronic measuring- and display device for temperature which is traceable to a acknowledged standards/calibration institution (DKD , PTB for Germany) with valid calibration certificate is recommended.

Measuring range for incubators at least 20°C to 100°C
Measuring range for warming and drying chambers at least 20°C to 300°C

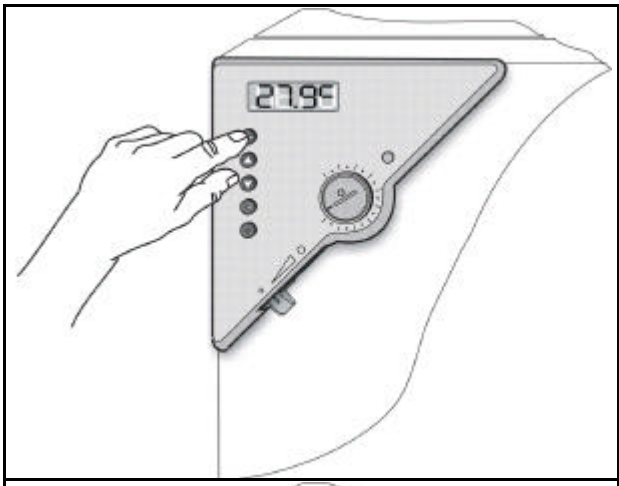
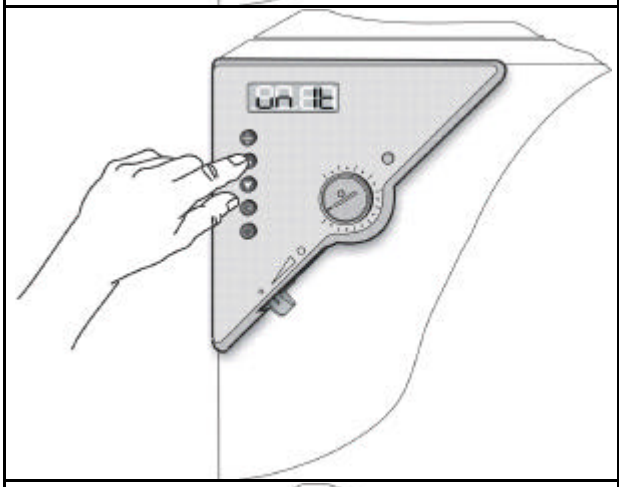
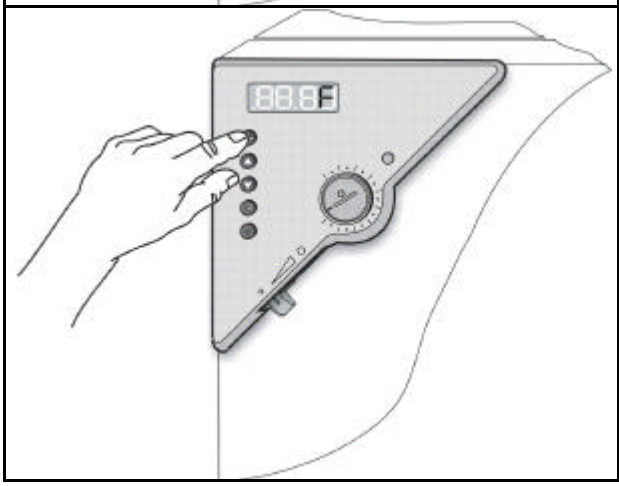
The sensor probe of the reference instrument placed in the centre of the usable chamber volume should be connected to the device via a thin cable suitable to be laid over the door sealing without causing any leakages.

Entering of the higher calibration point:
(One-Point-Calibration))


normal display
press △ and ▽ together for 5s
C211
X/W
C212 ↔ prevailing entry of the higher calibration point
enter with △ and ▽ the reference value
return with button X/W to normal display

Normally a "One-Point-Calibration" is enough to get a exact regulation of the chamber. If the customer works at two temperatures which are with a difference of more than 5°C you could do a "Two-Point-Calibration" to get a exact regulation.

4.4 Change Display from °C (Celsius) to °F (Fahrenheit)

	Press the Button X/W for at least 5 seconds The Display shows „unit“.
	Change the setting “C” with the Button ▲ into “F” Attention: The controller changes the value automatically into °F.
	Confirm your new setting by pressing the Button X/W Press the Button X/W 4 times to go back to the normal display

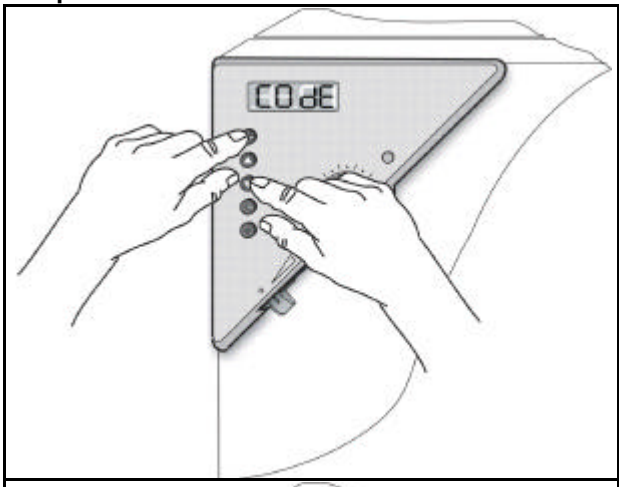
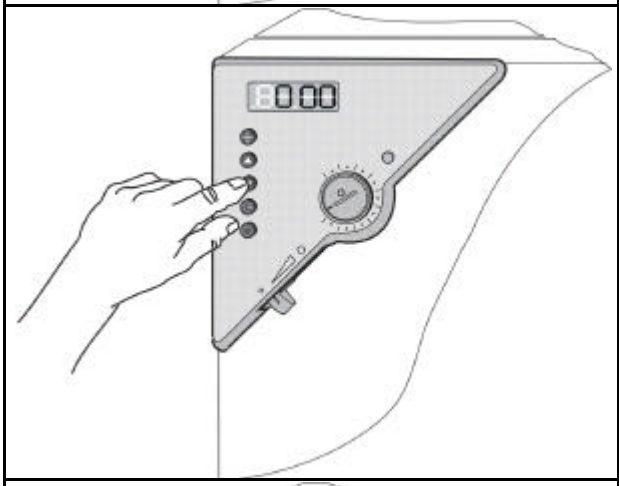
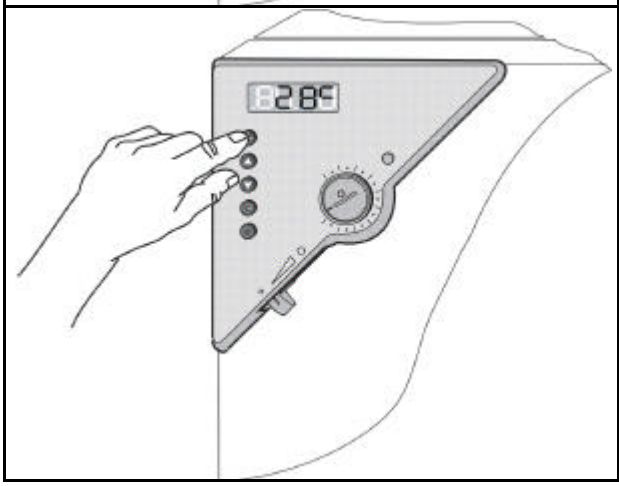
Remember:
If you set the chamber to °F, the highest Temperature is 300°F. This corresponds to approx. 148,62°C.

Correlation:
0°C = 31°F
100°C = 212°F
[Value in °F] = 1,81 x [Value in °C] + 31

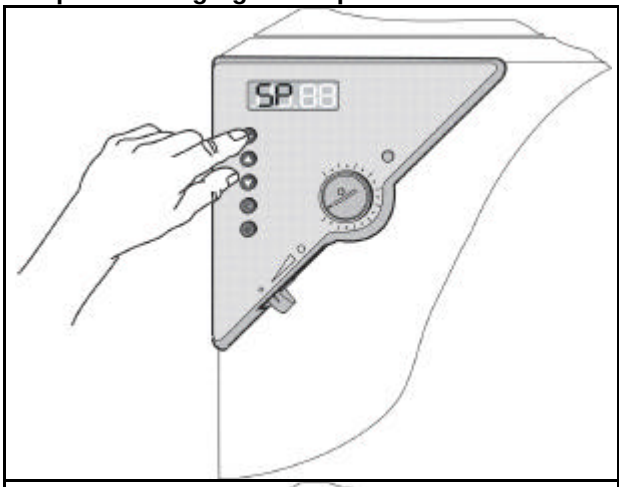
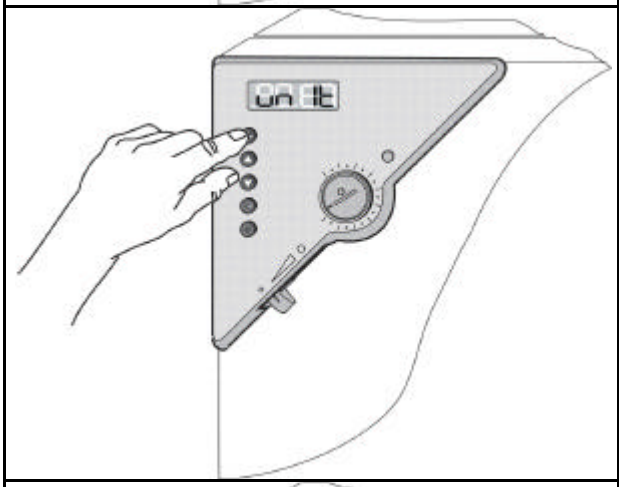
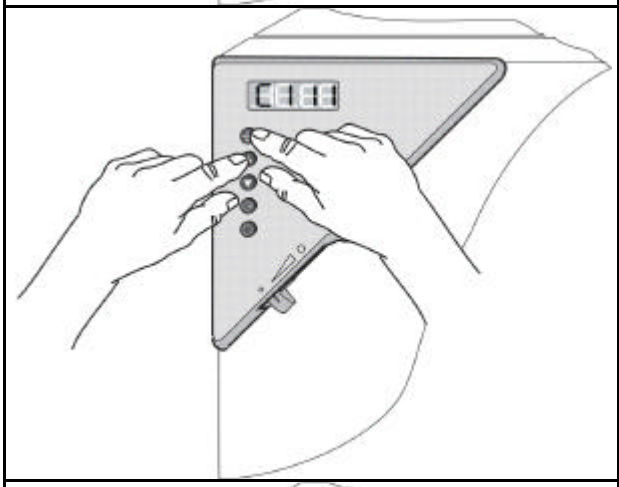
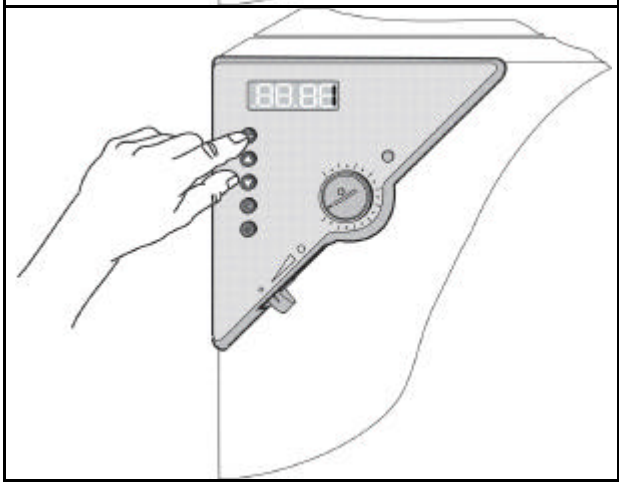
4.5 Activation or deactivation of 0.1 steps at the temperature display.

At the controller R3 it is possible to activate or deactivate the 0.1 step at the display.
At BD chambers which could heat up to 100°C the function is activated.
At ED and FD chambers the function is deactivated. Please note that the 0.1 steps is only displayed up to 99.9 °C, at 100°C the 0.1 step is deactivated automatically.

Step 1 – Deactivation of the Level-Protection

	To access the parameter level you have to unlock the Level-Protection. You have to press the Button X/W and ▼ for at least 10 seconds simultaneously
	Now you've reached the menu "Code" Press the Button ▼ to set the value "001" to "000"
	To confirm your setting press the Button X/W to go back to the normal display

Step 2 – Changing of the parameter for the 0.1 degree display

	Press the Button X/W for at least 5 seconds so that “unit” will be displayed
	Press the Button X/W for at least 5 seconds again so that “C111” will be displayed
	Press the Button ▼ for 1 time to set the “0” to “1” Confirm your setting by pressing the Button X/W
	Press the Button X/W 18 times to go back to normal display. The displayed value now is with 0.1 step **Please restore the Level-Protection. If not it is possible that the parameters could changed. The chamber doesn’t work correctly.**

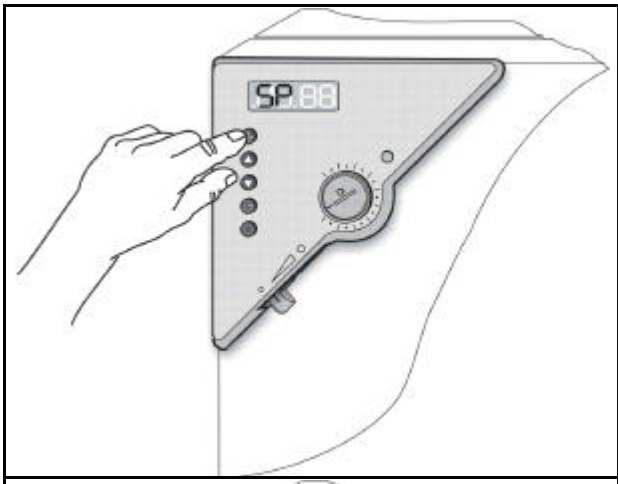
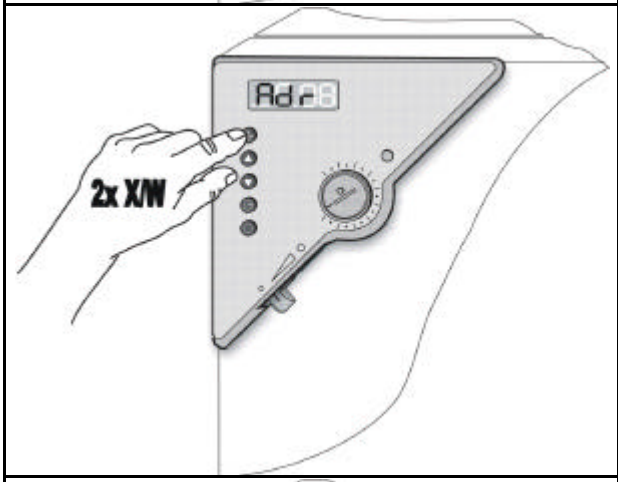
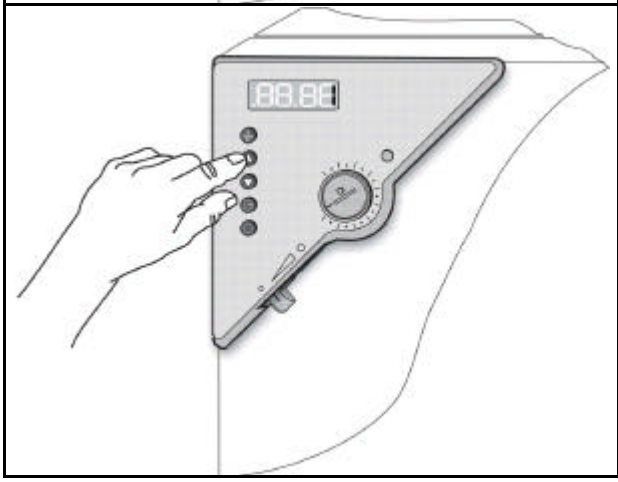
5 BD, ED and FD connected to APT-COM

5.1 Communication Software APT-COM

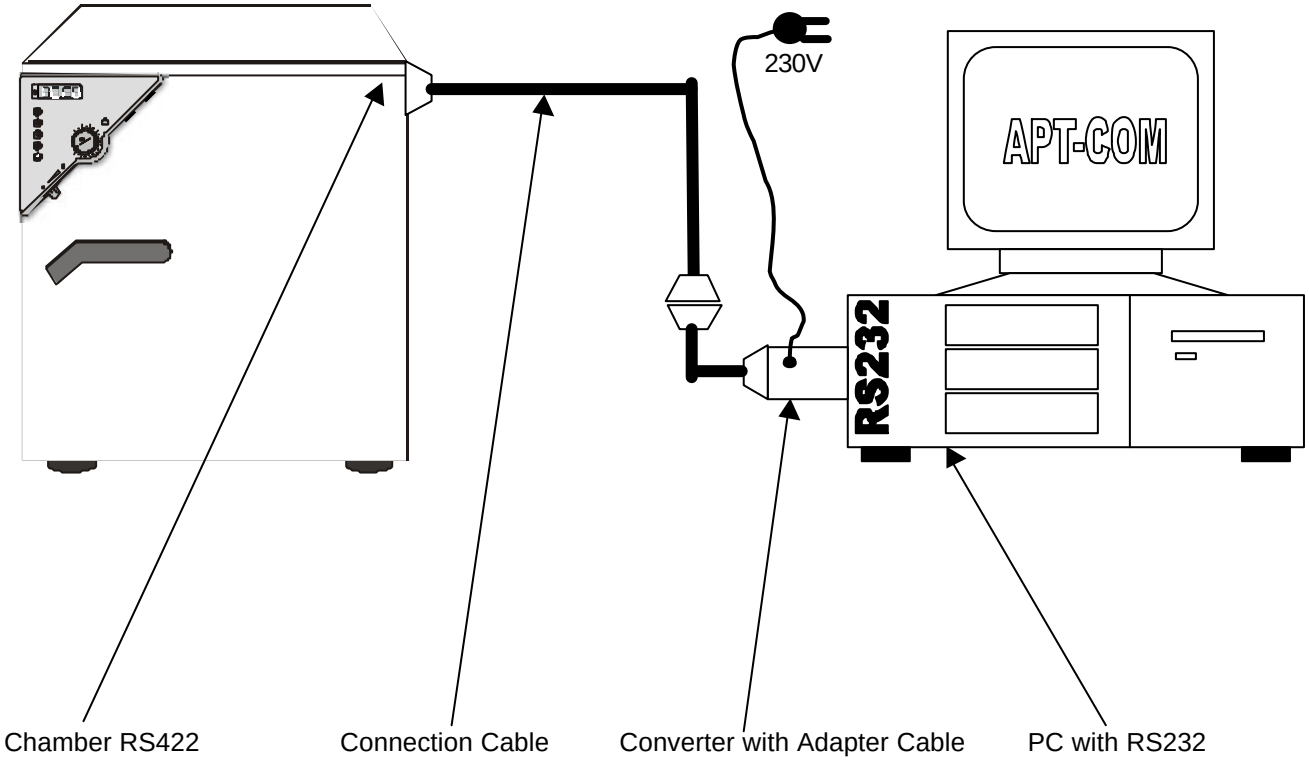
The units of size 400 and 720 are equipped as standard with an RS422 serial interface (option with size 53, 115 and 240), to which Binder's

5.2 Settings at the controller R3

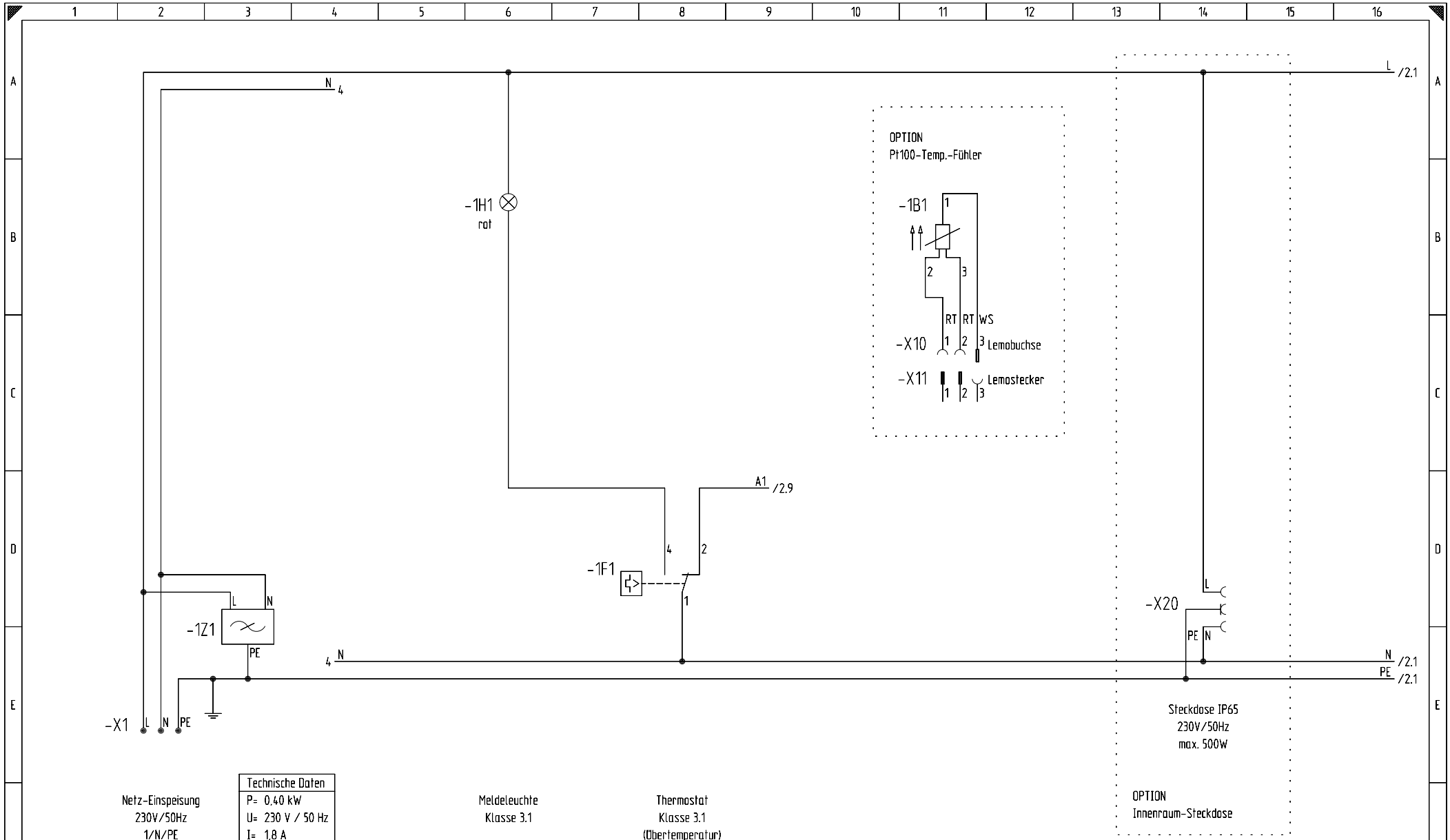
The factory setting of the controller is 1. You need this address, that the PC knows with which controller he has to exchange the data. The function is like a e-Mail System, every one needs a own address to get the correct data. If you connect more then one chamber, every one needs a own address (1.....30 max). Following described settings have to be done.

	The chamber is switched on and shows the actual Temperature Press the Button X/W for 5 seconds at least Till the display shows "unit"
	Press the Button X/W 2 times till the display shows "Adr" for 1 second
	The Display changes now automatically between „Adr" and the entered Address. Now choose the Address with the Buttons ▲ and ▼. Confirm your setting with the Button X/W till you're Back at the Temperature-Display

5.3 Connection of one chamber BD, ED or FD



If you'll connect more then one chambers, you need a plug-distributor between the chambers and the computer.



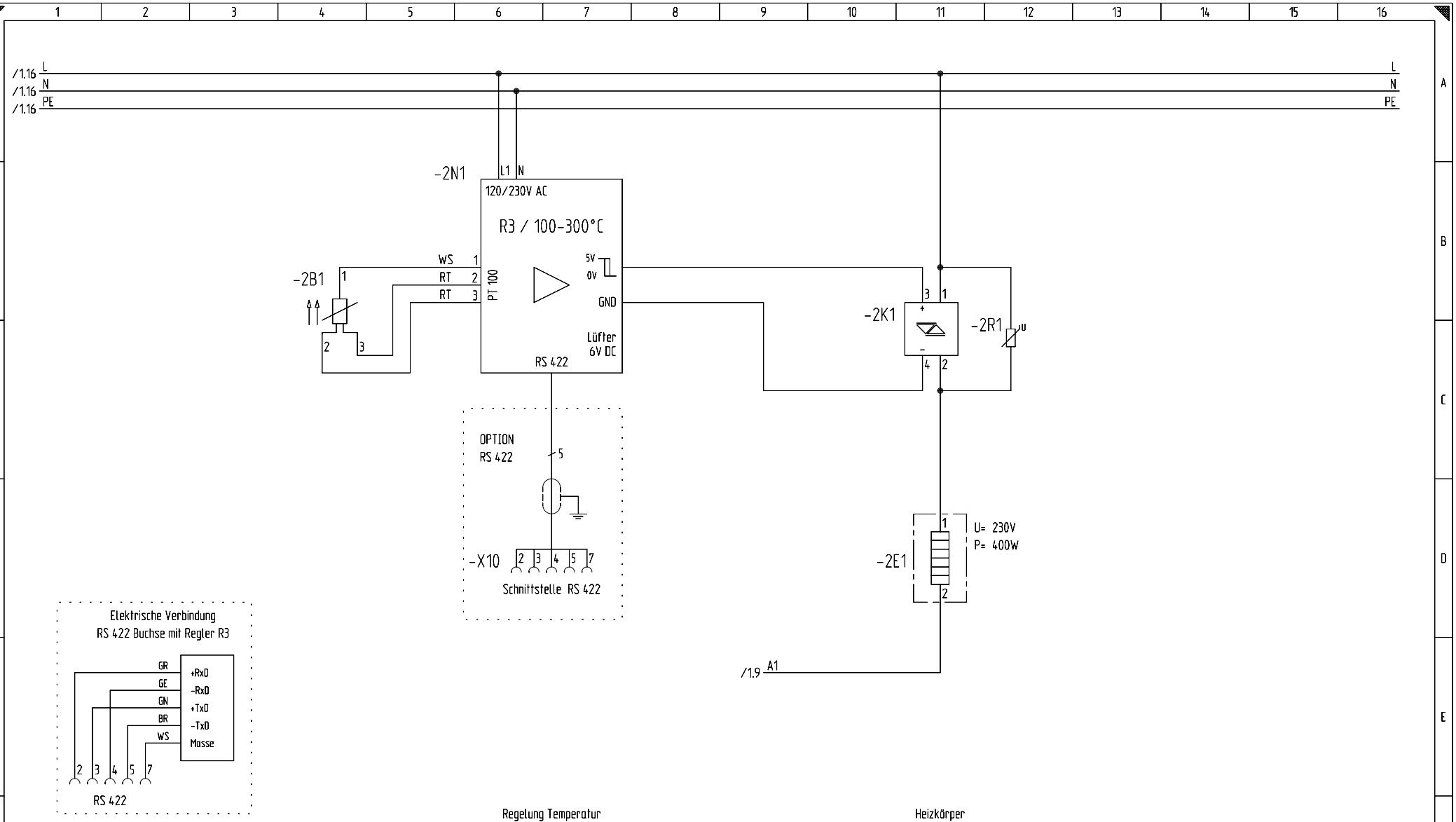
Netz-Einspeisung
230V/50Hz
1/N/PE

Technische Daten
P= 0,40 kW
U= 230 V / 50 Hz
I= 1,8 A

Meldeleuchte
Klasse 3.1

Thermostat
Klasse 3.1
(Übertemperatur)

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 53 (E2)	BINDER	Netz-Einspeisung und Steuerung Heizung	Modell BD 53 (E2) =
A				Bearb.	VS				+
				Gepr.	MS				
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr. 9010-0080/0081 File 55623001.PRO Blatt 1 von 2 Bl.



	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 53 (E2)	BINDER	Steuerung und Regelung Heizung	Modell BD 53 (E2)	=	
A				Bearb.	VS					+	
				Gepr.	MS				Art.-Nr. 9010-0080/0081	File 55623001.PRO	Blatt 2
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm		von 2 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	Kabelzugentlastung (3 Adern)	964 643 261 - Z 8,5 GK	6002-0004	1.2
		Gerätezuleitung 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	Einphasenfilter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	Anzeigeleuchte rot	Typ 9 - Nr. 31310	5008-0003	1.6
4	-1F1	Thermostat Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	1.11
6	-X10	Buchse 3-polig wasserdicht	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	Stecker 3-polig wasserdicht	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	Steckdose IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		Stecker IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	2.4
10	-2N1	Regler R 3 (100-300°C)	Typ R3	5014-0052	2.6
11	-X10	Kabel Schnittstelle RS 422	RS 422 für R3	5023-0050	2.7
		Schnittstellenkarte RS 422	TN: 00381008 für R3	5014-0055	2.7
12	-2E1	Heizkörper 230V/400W	KR 53389	5005-0026	2.11
13	-2K1	Halbleiterrelais 25A	D2425	5011-0022	2.11
14	-2R1	Varistor für Halbl.-Relais	S 20K 275	5018-0001	2.12

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 53 (E2)	BINDER		Modell	BD 53 (E2)	=	
A				Bearb.	VS						+	
				Gepr.	MS							
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr.	9010-0080/0081	File	55623001.PRO	Blatt 1	von 1 Bl.					

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	cable connection	964 643 261 - Z 8,5 GK	6002-0004	1.2
		net cable 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	net filter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	signal lamp red	type 9 - Nr. 31310	5008-0003	1.6
4	-1F1	thermometer Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100	TN: 00355341	5002-0008	1.11
6	-X10	socket 3-pole watertight	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	connector 3-pole watertight	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	power socket IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		mains plug IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100	TN: 00355341	5002-0008	2.4
10	-2N1	controller R 3 (100-300°C)	type R3	5014-0052	2.6
11	-X10	cable interface RS 422	RS 422 for R3	5023-0050	2.7
		interface RS422 (R3)	TN: 00381008	5014-0055	2.7
12	-2E1	radiator 230V/400W	KR 53389	5005-0026	2.11
13	-2K1	solid state relay 25A	D2425	5011-0022	2.11
14	-2R1	varistor	S 20K 275	5018-0001	2.12

Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.
	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001			
A				Bearb.	VS			
				Gepr.	MS			

STANDARDSCHALTPLAN
BD 53 (E2)

BINDER

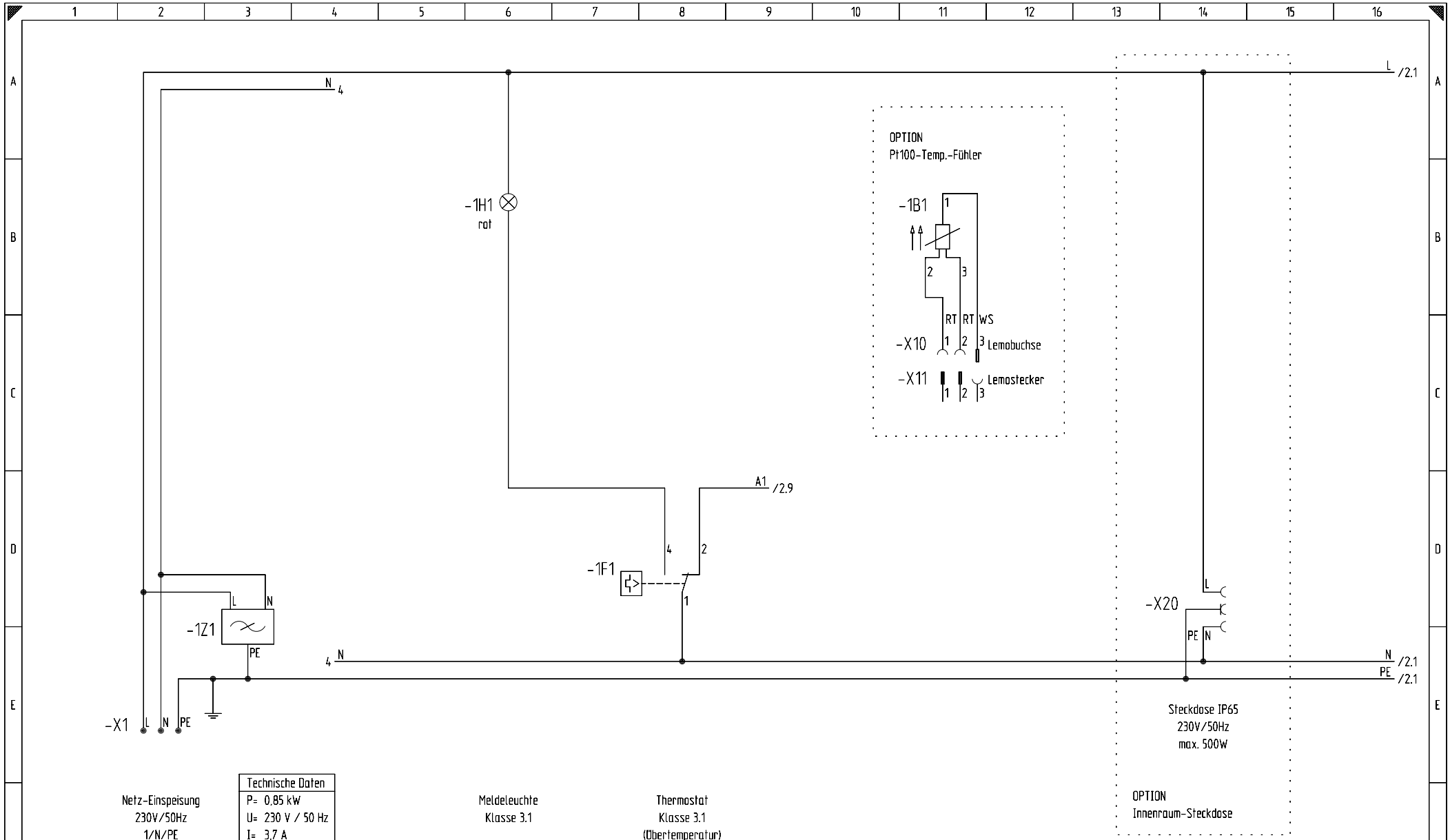
Produktionsstückliste / production parts list

Modell: BD 53 (E2)

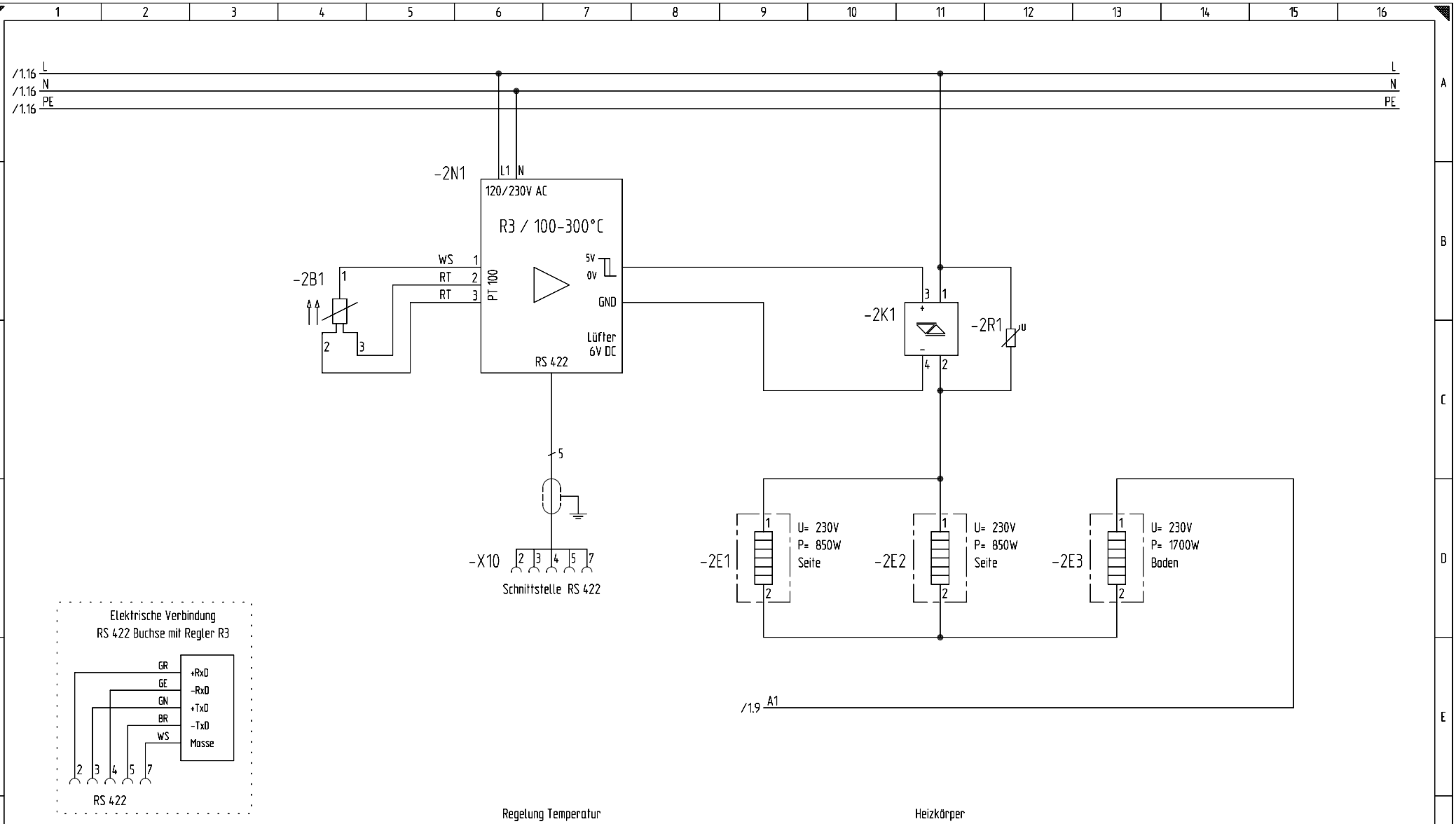
Art.-Nr.: 9010-0080/0081

File: 55623001.PRO

Blatt 1 von 1 Bl.



	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 400 (E2)	BINDER	Netz-Einspeisung und Steuerung Heizung	Modell BD 400 (E2)	=
A				Bearb.	VS					+
				Gepr.	MS					
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr. 9010-0073	File 55653001.PRO	Blatt 1 von 2 Bl.



	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 400 (E2)	BINDER	Steuerung und Regelung Heizung	Modell	BD 400 (E2)		=	
A				Bearb.	VS							+	
				Gepr.	MS								
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr.	9010-0073	File	55653001.PRO	Blatt	2
														von	2 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	Kabelzugentlastung (3 Adern)	964 643 261 - Z 8,5 GK	6002-0004	1.2
		Gerätezuleitung 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	Einphasenfilter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	Anzeigeleuchte rot	Typ 9 - Nr. 31310	5008-0003	1.6
4	-1F1	Thermostat Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	1.11
6	-X10	Buchse 3-polig wasserdicht	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	Stecker 3-polig wasserdicht	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	Steckdose IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		Stecker IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	2.4
10	-2N1	Regler R 3 (100-300°C)	Typ R3	5014-0052	2.6
11	-X10	Kabel Schnittstelle RS 422	RS 422 für R3	5023-0050	2.7
		Schnittstellenkarte RS 422	TN: 00381008 für R3	5014-0055	2.7
12	-2E1	Heizkörper 230V/850W	KR 55485	5005-0031	2.9
13	-2E2	Heizkörper 230V/850W	KR 55485	5005-0031	2.11
14	-2K1	Halbleiterrelais 25A	D2425	5011-0022	2.11
15	-2R1	Varistor für Halbl.-Relais	S 20K 275	5018-0001	2.12
16	-2E3	Heizkörper 230V/1700W	KR 55486	5005-0032	2.13

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 400 (E2)	BINDER		Modell	BD 400 (E2)	=
A				Bearb.	VS						+
				Gepr.	MS						
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr. 9010-0073	File 55653001.PRO	Blatt 1 von 1 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	cable connection	964 643 261 - Z 8,5 GK	6002-0004	1.2
		net cable 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	net filter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	signal lamp red	type 9 - Nr. 31310	5008-0003	1.6
4	-1F1	thermometer Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100	TN: 00355341	5002-0008	1.11
6	-X10	socket 3-pole watertight	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	connector 3-pole watertight	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	power socket IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		mains plug IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100	TN: 00355341	5002-0008	2.4
10	-2N1	controller R 3 (100-300°C)	type R3	5014-0052	2.6
11	-X10	cable interface RS 422	RS 422 for R3	5023-0050	2.7
		interface RS422 (R3)	TN: 00381008	5014-0055	2.7
12	-2E1	radiator 230V/850W	KR 55485	5005-0031	2.9
13	-2E2	radiator 230V/850W	KR 55485	5005-0031	2.11
14	-2K1	solid state relay 25A	D2425	5011-0022	2.11
15	-2R1	varistor	S 20K 275	5018-0001	2.12
16	-2E3	radiator 230V/1700W	KR 55486	5005-0032	2.13

Zustand	Änderung	Datum	Name	Norm
	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum 27.02.2001
A				Bearb. VS
				Gepr. MS

STANDARDSCHALTPLAN
BD 400 (E2)

Ursprung | Ers. f. | Ers. d.

BINDER

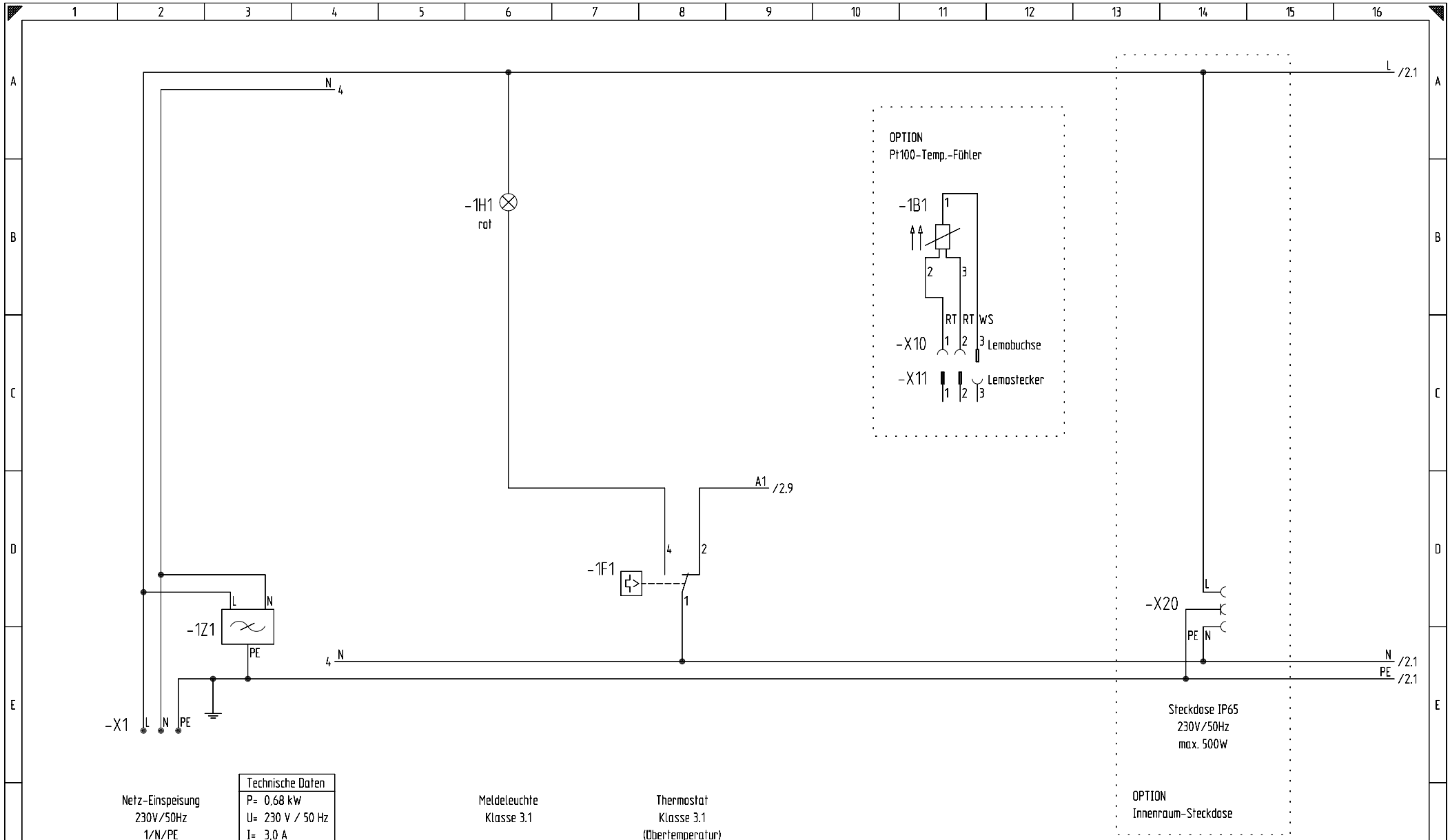
Produktionsstückliste / production parts list

Modell: BD 400 (E2)

Art.-Nr.: 9010-0073

File: 55653001.PRO

Blatt 1 von 1 Bl.



Netz-Einspeisung
230V/50Hz
1/N/PE

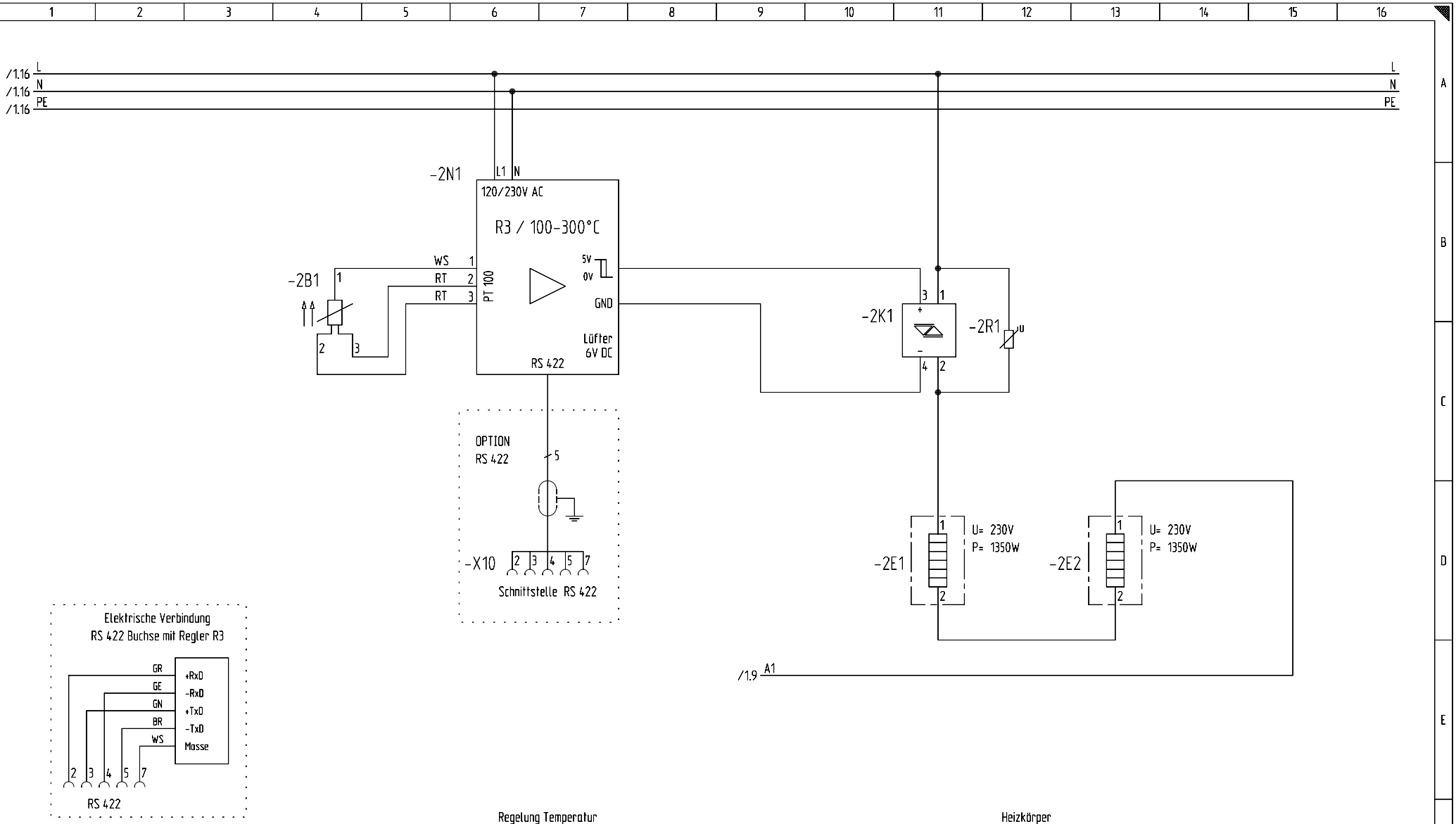
Technische Daten
P= 0.68 kW
U= 230 V / 50 Hz
I= 3.0 A

Meldeleuchte
Klasse 3.1

Thermostat
Klasse 3.1
(Übertemperatur)

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 240 (E2)	BINDER	Netz-Einspeisung und Steuerung Heizung	Modell: BD 240 (E2)
A				Bearb.	VS				
				Gepr.	MS				Art.-Nr.: 9010-0089/0095
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	File: 55643001.PRO

Blatt 1 von 2 Bl.



	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 240 (E2)	BINDER	Steuerung und Regelung Heizung	Modell	BD 240 (E2)		=	
A				Bearb.	VS							+	
				Gepr.	MS								
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr.	9010-0089/0095	File	55643001.PRO	Blatt	2
														von	2 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	Kabelzugentlastung (3 Adern)	964 643 261 - Z 8,5 GK	6002-0004	1.2
		Gerätezuleitung 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	Einphasenfilter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	Anzeigeleuchte rot	Typ 9 - Nr. 31310	5008-0003	1.6
4	-1F1	Thermostat Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	1.11
6	-X10	Buchse 3-polig wasserdicht	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	Stecker 3-polig wasserdicht	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	Steckdose IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		Stecker IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	2.4
10	-2N1	Regler R 3 (100-300°C)	Typ R3	5014-0052	2.6
11	-X10	Kabel Schnittstelle RS 422	RS 422 für R3	5023-0050	2.7
		Schnittstellenkarte RS 422	TN: 00381008 für R3	5014-0055	2.7
12	-2E1	Heizkörper 230V/1350W	KR 54659	5005-0030	2.11
13	-2K1	Halbleiterrelais 25A	D2425	5011-0022	2.11
14	-2R1	Varistor für Halbl.-Relais	S 20K 275	5018-0001	2.12
15	-2E2	Heizkörper 230V/1350W	KR 54659	5005-0030	2.13

Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.
	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001			
A				Bearb.	VS			
				Gepr.	MS			

STANDARDSCHALTPLAN
BD 240 (E2)

BINDER

Produktionsstückliste / production parts list

Modell: BD 240 (E2)

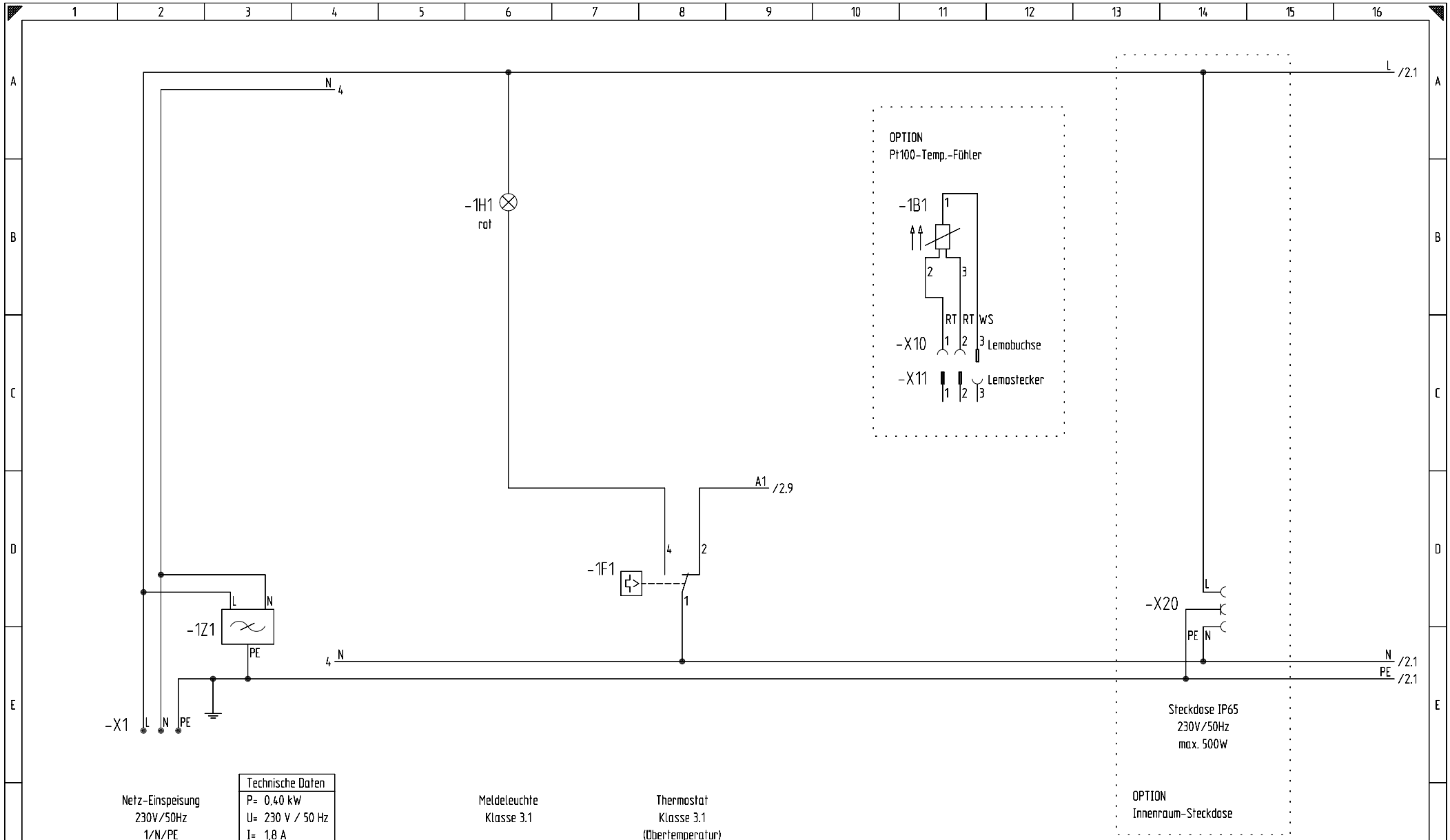
Art.-Nr.: 9010-0089/0095

File: 55643001.PRO

Blatt 1 von 1 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	cable connection	964 643 261 - Z 8,5 GK	6002-0004	1.2
		net cable 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	net filter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	signal lamp red	type 9 - Nr. 31310	5008-0003	1.6
4	-1F1	thermometer Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100	TN: 00355341	5002-0008	1.11
6	-X10	socket 3-pole watertight	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	connector 3-pole watertight	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	power socket IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		mains plug IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100	TN: 00355341	5002-0008	2.4
10	-2N1	controller R 3 (100-300°C)	type R3	5014-0052	2.6
11	-X10	cable interface RS 422	RS 422 for R3	5023-0050	2.7
		interface RS422 (R3)	TN: 00381008	5014-0055	2.7
12	-2E1	radiator 230V/1350W	KR 54659	5005-0030	2.11
13	-2K1	solid state relay 25A	D2425	5011-0022	2.11
14	-2R1	varistor	S 20K 275	5018-0001	2.12
15	-2E2	radiator 230V/1350W	KR 54659	5005-0030	2.13

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 240 (E2)	BINDER		Modell	BD 240 (E2)	=
A				Bearb.	VS						+
				Gepr.	MS						
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr. 9010-0089/0095	File 55643001.PRO	Blatt 1 von 1 Bl.



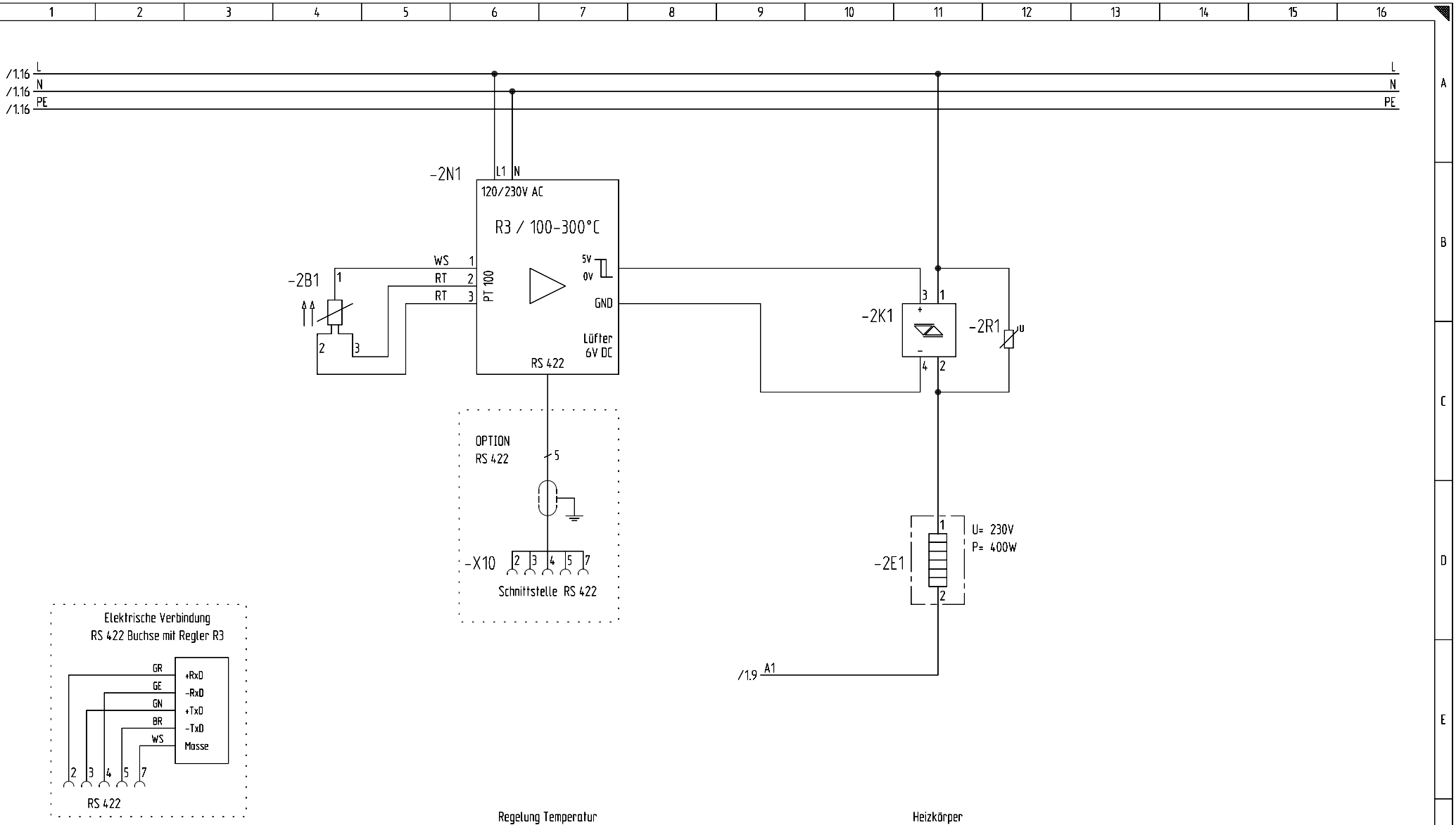
Netz-Einspeisung
230V/50Hz
1/N/PE

Technische Daten
P= 0,40 kW
U= 230 V / 50 Hz
I= 1,8 A

Meldeleuchte
Klasse 3.1

Thermostat
Klasse 3.1
(Übertemperatur)

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 115 (E2)	BINDER	Netz-Einspeisung und Steuerung Heizung	Modell: BD 115 (E2)
A				Bearb.	VS				
				Gepr.	MS				
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr. 9010-0086/0088 · File 55633001.PRO · Blatt 1 von 2 Bl.



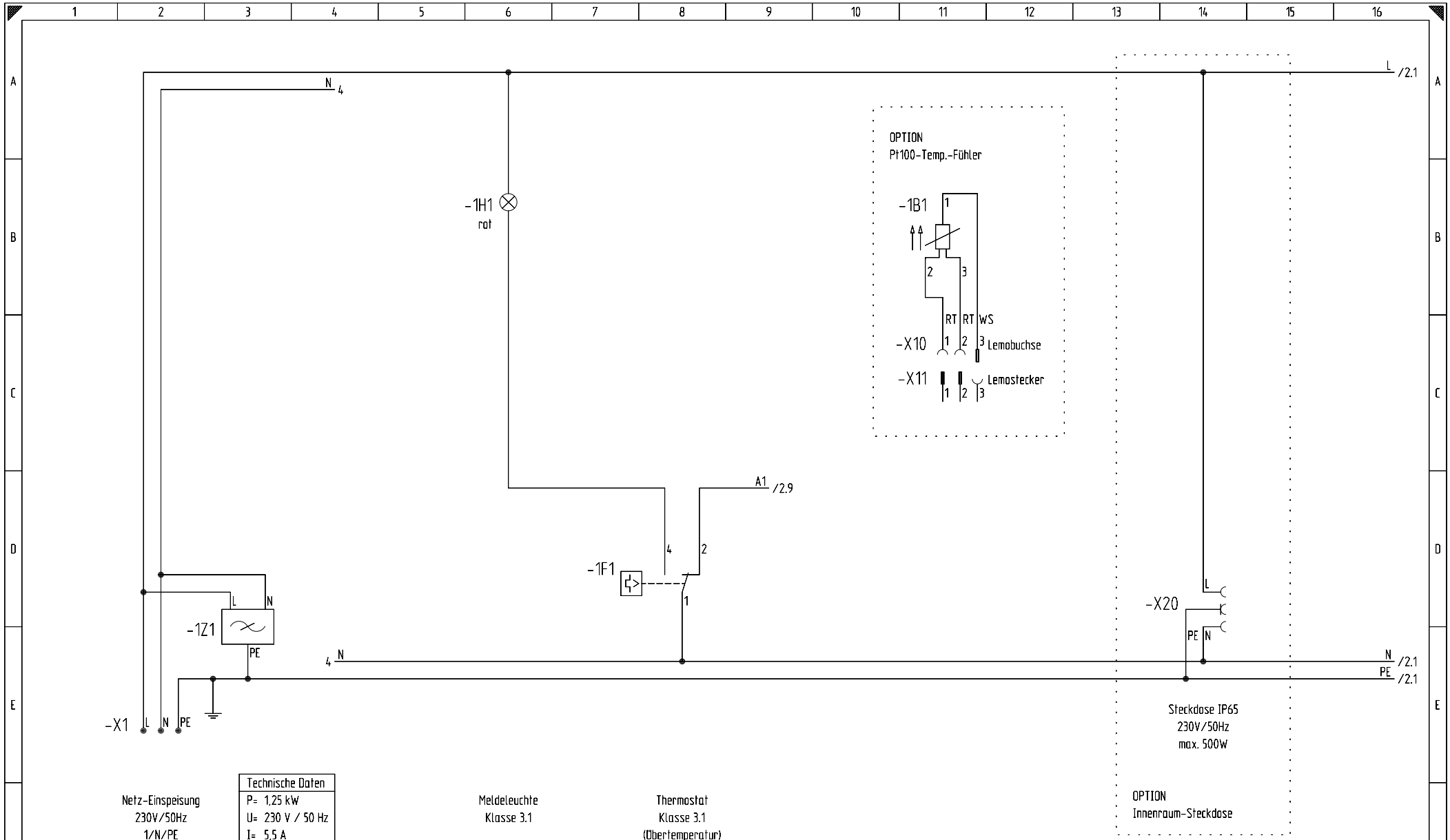
	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 115 (E2)	BINDER	Steuerung und Regelung Heizung	Modell	BD 115 (E2)		=				
A				Bearb.	VS							+				
				Gepr.	MS											
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	Art.-Nr.	9010-0086/0088	File	55633001.PRO		Blatt 2	von 2 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	Kabelzugentlastung (3 Adern)	964 643 261 - Z 8,5 GK	6002-0004	1.2
		Gerätezuleitung 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	Einphasenfilter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	Anzeigeleuchte rot	Typ 9 - Nr. 31310	5008-0003	1.6
4	-1F1	Thermostat Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	1.11
6	-X10	Buchse 3-polig wasserdicht	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	Stecker 3-polig wasserdicht	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	Steckdose IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		Stecker IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	2.4
10	-2N1	Regler R 3 (100-300°C)	Typ R3	5014-0052	2.6
11	-X10	Kabel Schnittstelle RS 422	RS 422 für R3	5023-0050	2.7
		Schnittstellenkarte RS 422	TN: 00381008 für R3	5014-0055	2.7
12	-2E1	Heizkörper 230V/400W	KR 53469	5005-0028	2.11
13	-2K1	Halbleiterrelais 25A	D2425	5011-0022	2.11
14	-2R1	Varistor für Halbl.-Relais	S 20K 275	5018-0001	2.12

		ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 115 (E2)	BINDER		Modell	BD 115 (E2)		=						
	A				Bearb.	VS							+						
					Gepr.	MS													
	Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr.	9010-0086/0088	File	55633001.PRO		Blatt 1 von 1 Bl.			

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	cable connection	964 643 261 - Z 8,5 GK	6002-0004	1.2
		net cable 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	net filter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	signal lamp red	type 9 - Nr. 31310	5008-0003	1.6
4	-1F1	thermometer Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100	TN: 00355341	5002-0008	1.11
6	-X10	socket 3-pole watertight	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	connector 3-pole watertight	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	power socket IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		mains plug IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100	TN: 00355341	5002-0008	2.4
10	-2N1	controller R 3 (100-300°C)	type R3	5014-0052	2.6
11	-X10	cable interface RS 422	RS 422 for R3	5023-0050	2.7
		interface RS422 (R3)	TN: 00381008	5014-0055	2.7
12	-2E1	radiator 230V/400W	KR 53469	5005-0028	2.11
13	-2K1	solid state relay 25A	D2425	5011-0022	2.11
14	-2R1	varistor	S 20K 275	5018-0001	2.12

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 115 (E2)	BINDER		Modell	BD 115 (E2)	=
A				Bearb.	VS						+
				Gepr.	MS						
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr. 9010-0086/0088	File 55633001.PRO	Blatt 1 von 1 Bl.



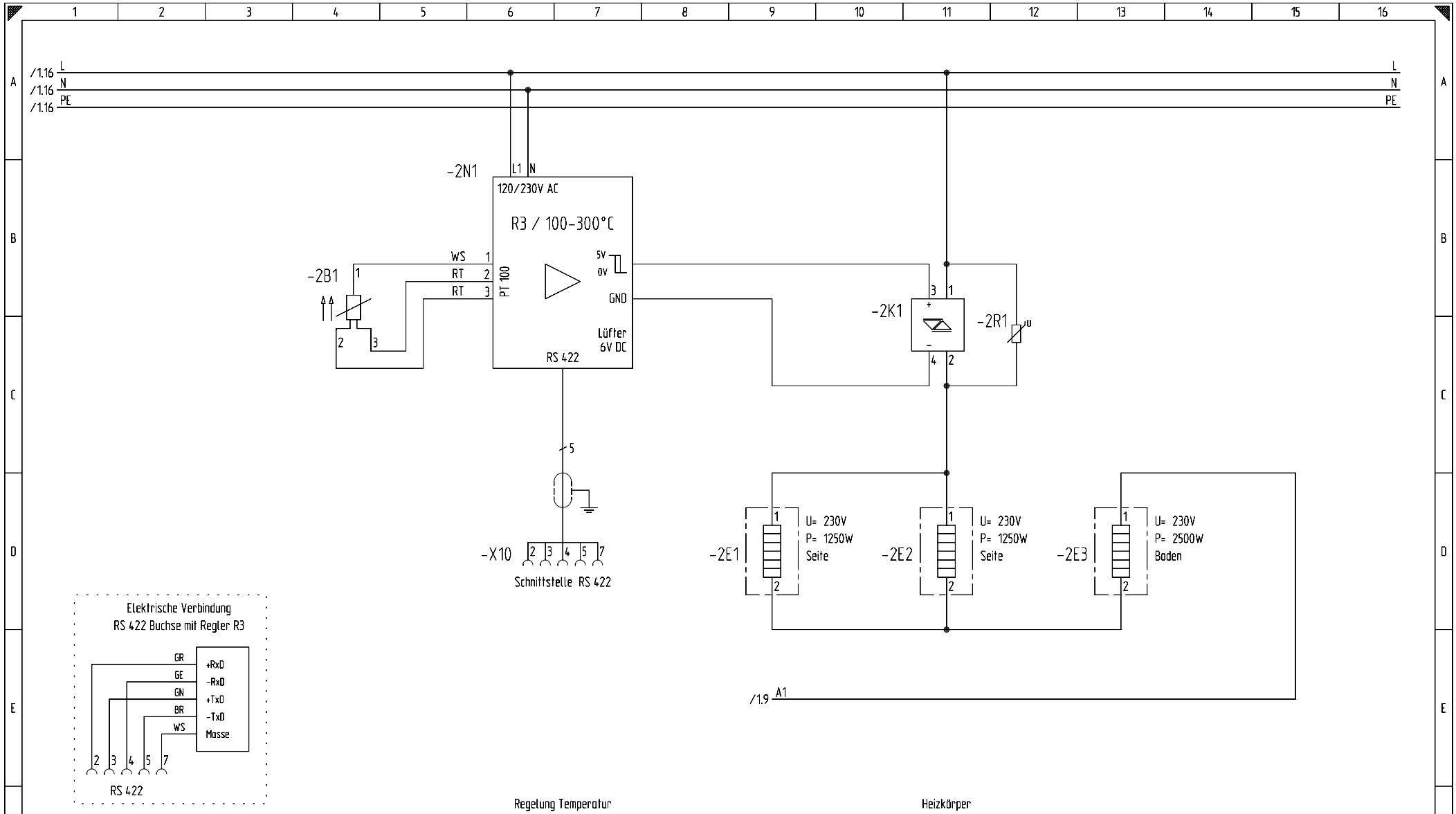
Netz-Einspeisung
230V/50Hz
1/N/PE

Technische Daten
P= 1,25 kW
U= 230 V / 50 Hz
I= 5,5 A

Meldeleuchte
Klasse 3.1

Thermostat
Klasse 3.1
(Übertemperatur)

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 720 (E2)	BINDER	Netz-Einspeisung und Steuerung Heizung	Modell: BD 720 (E2)
A				Bearb.	VS				
				Gepr.	MS				Art.-Nr.: 9010-0074 / File: 55663001.PRO / Blatt 1 von 2 Bl.
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm	



	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 720 (E2)	BINDER	Steuerung und Regelung Heizung	Modell	BD 720 (E2)		=	
A				Bearb.	VS							+	
				Gepr.	MS				Art.-Nr.	9010-0074	File	55663001.PRO	Blatt 2
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Stromlaufplan / wiring diagramm				von 2 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	Kabelzugentlastung (3 Adern)	964 643 261 - Z 8,5 GK	6002-0004	1.2
		Gerätezuleitung 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	Einphasenfilter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	Anzeigeleuchte rot	Typ 9 - Nr. 31310	5008-0003	1.6
4	-1F1	Thermostat Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	1.11
6	-X10	Buchse 3-polig wasserdicht	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	Stecker 3-polig wasserdicht	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	Steckdose IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		Stecker IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100 gerade + Aderendhülse	TN: 00355341	5002-0008	2.4
10	-2N1	Regler R 3 (100-300°C)	Typ R3	5014-0052	2.6
11	-X10	Kabel Schnittstelle RS 422	RS 422 für R3	5023-0050	2.7
		Schnittstellenkarte RS 422	TN: 00381008 für R3	5014-0055	2.7
12	-2E1	Heizkörper 230V/1250W	KR 55741	5005-0033	2.9
13	-2E2	Heizkörper 230V/1250W	KR 55741	5005-0033	2.11
14	-2K1	Halbleiterrelais 25A	D2425	5011-0022	2.11
15	-2R1	Varistor für Halbl.-Relais	S 20K 275	5018-0001	2.12
16	-2E3	Heizkörper 230V/2500W	KR 55742	5005-0034	2.13

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 720 (E2)	BINDER		Modell	BD 720 (E2)	=
A				Bearb.	VS						+
				Gepr.	MS						
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr. 9010-0074	File 55663001.PRO	Blatt 1 von 1 Bl.

Pos. position	BmK. marking	Bezeichnung designation	Typenbezeichnung model number	Teilenummer part number	Bl./Pf. location
1	-X1	cable connection	964 643 261 - Z 8,5 GK	6002-0004	1.2
		net cable 230V AC	H05VV-F3G1,5 - 3x1,5mm² (sw)	5023-0002	1.2
2	-1Z1	net filter	KPB 7012/47/4700	5026-0001	1.3
3	-1H1	signal lamp red	type 9 - Nr. 31310	5008-0003	1.6
4	-1F1	thermometer Kl 3.1, 0-120°C	EMF-1/B1	5006-0035	1.8
5	-1B1	Pt 100	TN: 00355341	5002-0008	1.11
6	-X10	socket 3-pole watertight	ERA.1E.303.CLL	5024-0026	1.11
7	-X11	connector 3-pole watertight	FFA.1E.303.CLA.C40	5024-0027	1.11
8	-X20	power socket IP65 - 230VAC/16A	0501-4-2192	5024-0037	1.14
		mains plug IP65	0501-4-2212	5024-0038	1.14
9	-2B1	Pt 100	TN: 00355341	5002-0008	2.4
10	-2N1	controller R 3 (100-300°C)	type R3	5014-0052	2.6
11	-X10	cable interface RS 422	RS 422 for R3	5023-0050	2.7
		interface RS422 (R3)	TN: 00381008	5014-0055	2.7
12	-2E1	radiator 230V/1250W	KR 55741	5005-0033	2.9
13	-2E2	radiator 230V/1250W	KR 55741	5005-0033	2.11
14	-2K1	solid state relay 25A	D2425	5011-0022	2.11
15	-2R1	varistor	S 20K 275	5018-0001	2.12
16	-2E3	radiator 230V/2500W	KR 55742	5005-0034	2.13

	ab PL 06 / 2000 - erstellt	27.02.2001	VS	Datum	27.02.2001	STANDARDSCHALTPLAN BD 720 (E2)	BINDER		Modell	BD 720 (E2)	=
A				Bearb.	VS						+
				Gepr.	MS						
Zustand	Änderung	Datum	Name	Norm		Ursprung	Ers. f.	Ers. d.	Produktionsstückliste / production parts list	Art.-Nr. 9010-0074	File 55663001.PRO	Blatt 1 von 1 Bl.